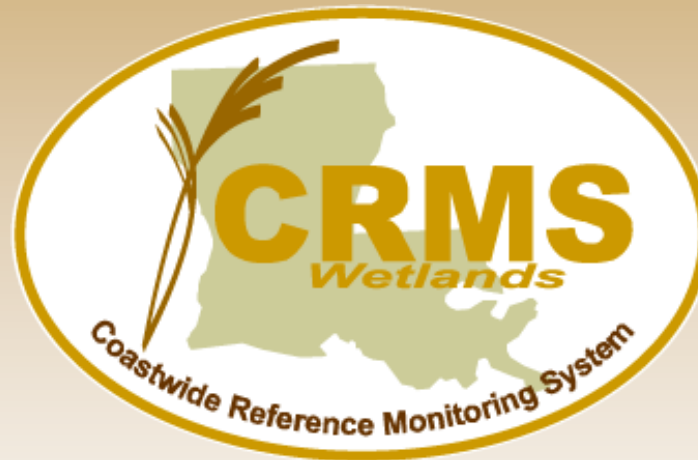


CRMS Website Training



May 2016

<http://www.lacoast.gov/crms>

703.648.4848

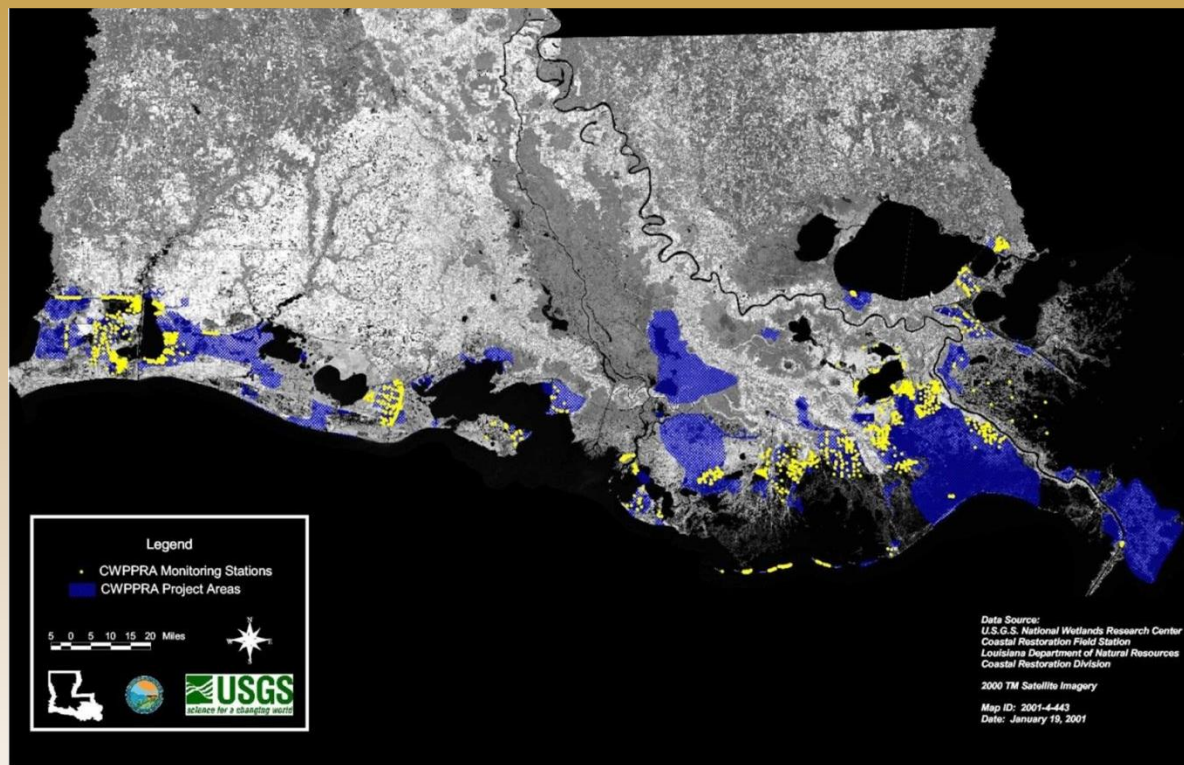
69619006#



Coastwide Reference Monitoring System – *Wetlands* Training Plan

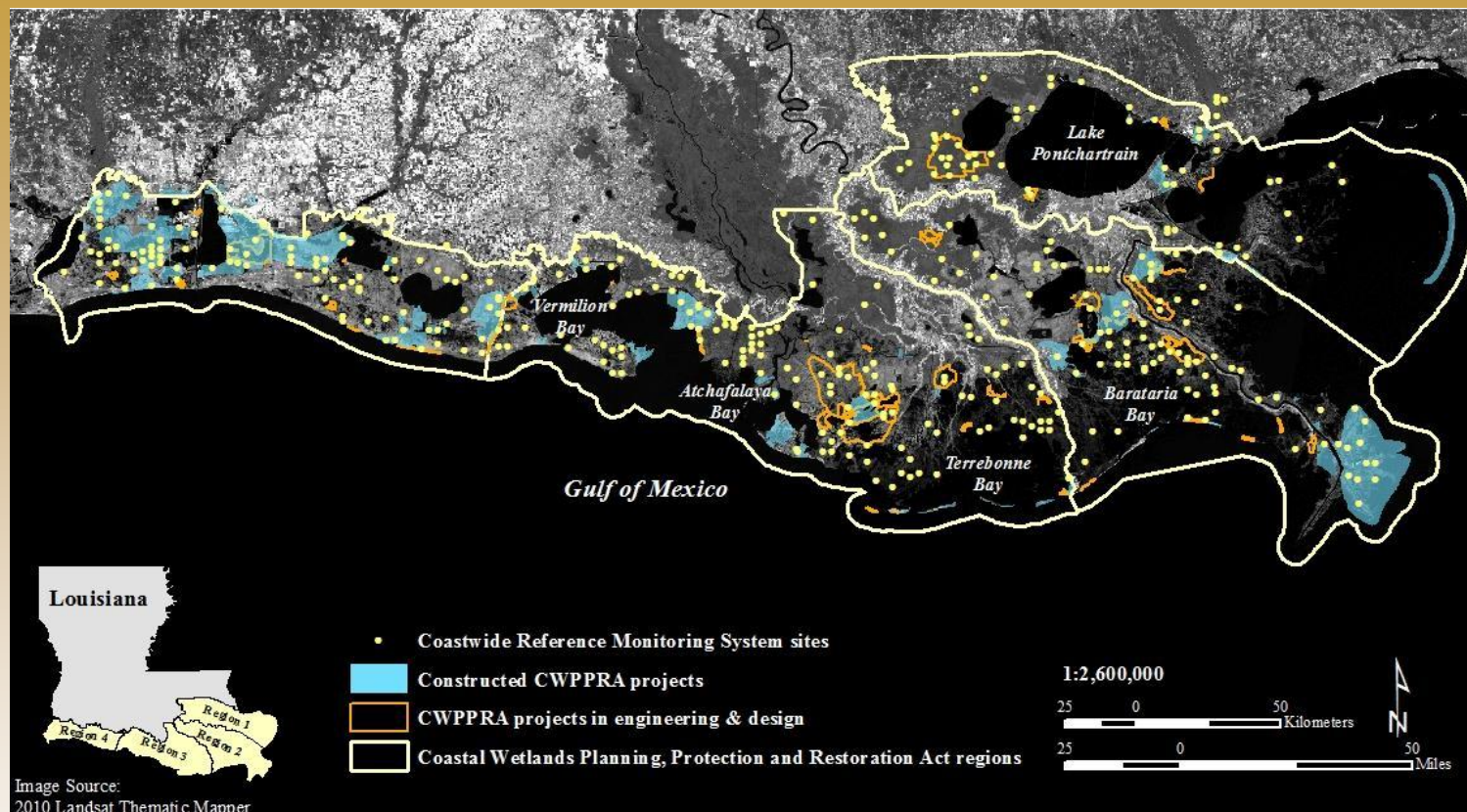
- **Introduction**
- **Resources on website**
 - Library & Program Headings**
- **CWPPRA/CRMS background**
- **Charting**
- **Bulk Charting**
- **Data Download**
- **Mapping Viewer**





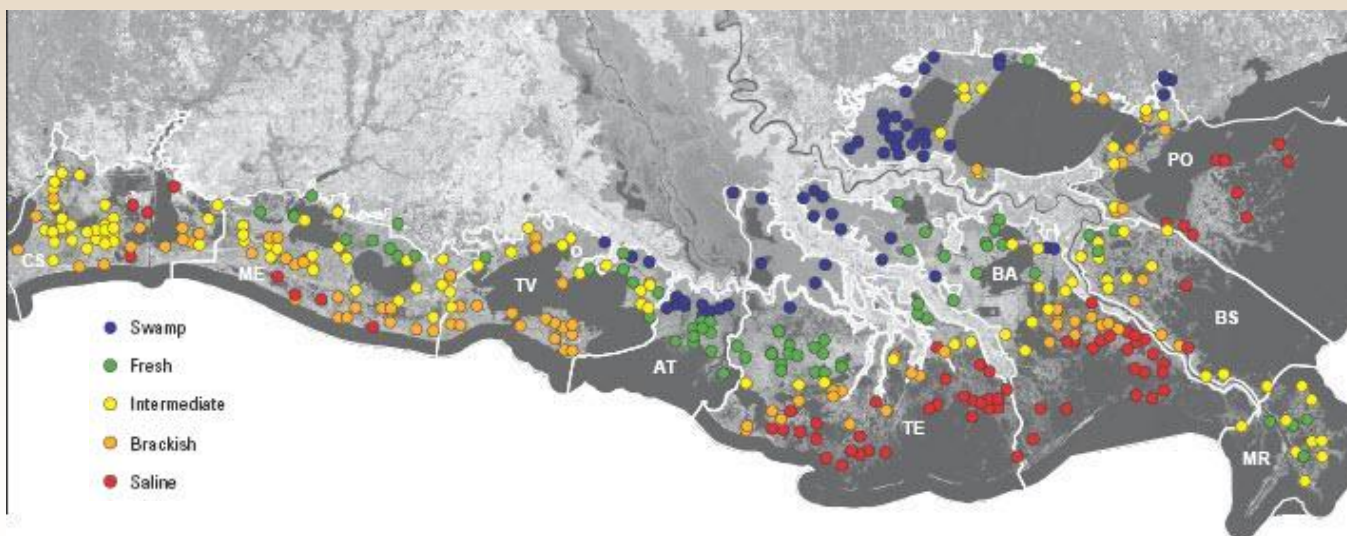
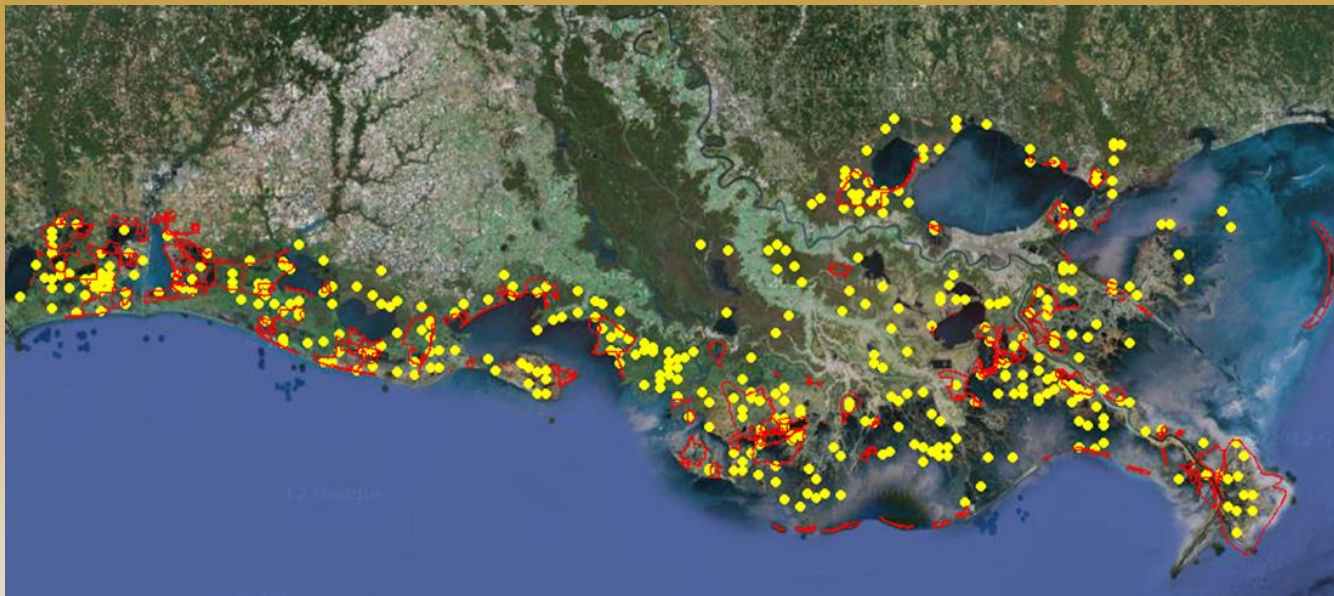
Restoration project types: diversions of freshwater and sediments, marsh creation, shoreline protection, sediment and nutrient trapping, hydrologic restoration, and vegetation planting

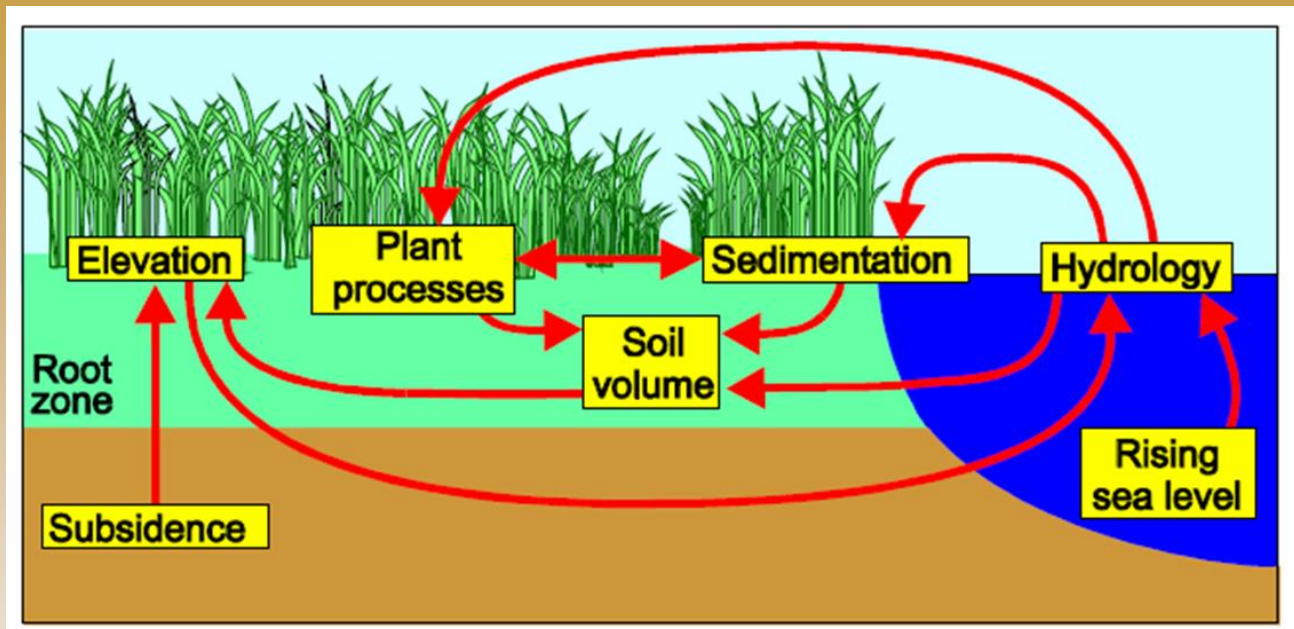
- CWPPRA was congressionally funded in 1990 and mandated 20 years of restoration project monitoring
- CWPPRA program uses multiple restoration techniques
 - size and types of projects vary
- Initially the program used paired project and reference sites
 - with time, difficult to find “uninfluenced” reference
- Inconsistent monitoring variables and collection frequencies across projects with short data records



- To improve our ability to determine the effectiveness of individual coastal restoration projects.
- Provide information to evaluate coastal wetlands at the project, basin, and coastwide scales.
- To determine the ecological condition of coastal wetlands to ensure that the strategic coastal planning for Louisiana (Coast 2050, LCA, Louisiana Master Plan) is effective in recreating a sustainable coastal ecosystem.

- Funded by CWPPRA in 2003 & State of LA
- CPRA/USGS Sponsors
- ~ 390 CRMS sites
- Long-term dataset (2006-2019)
- Sites inside & outside of CWPPRA projects
- Sites in swamp, fresh, intermediate, brackish, and salt marsh
- Barrier islands monitored through BICM, not CRMS
- Allows for multi-scale assessments through CRMS report cards
- Data used for future scenario modeling



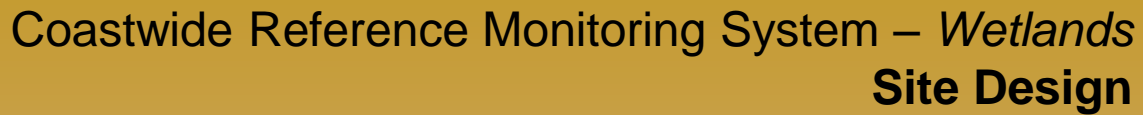


Questions to address through CRMS:

Did the restoration program:

- reduce coastal wetland loss?
- sustain a diversity of vegetation types within basins?

Is the restoration program effective in reducing major stressors on wetlands (i.e., flooding regime, salinity, elevation change)?



Typical Swamp Site

CRMS Site vs. CRMS Station



Coastwide Reference Monitoring System – *Wetlands* Station Naming Conventions

CRMS DATA COLLECTION INFORMATION AND SCHEDULE

CRMS website: <http://lacoast.gov/crms>

Standard operating procedures: CRMS website-Program/Administration/Support Docs/Folse et al. 2014.

Download “raw” data from Coastal Information Management System (CIMS): CRMS website-Data/Tabular/CIMS Data Tool (<http://cims.coastal.louisiana.gov/>)

Hydrographic: Station number (H01): Continuous hourly salinity, temperature, and water level data are collected. At most sites the data sonde is in an open water body or bayou.

- Station number (W01): Continuous hourly salinity, temperature, and water level but the data sonde is in a well in the marsh instead of an open water body.
- Station number (M01): Marsh mat stations are established in floating marshes where the marsh mat rises and falls with water level.

CRMS sites with *realtime* hydro gages: CRMS0061, 0282, 0411, 0465, 0568, 0609, 0615, 0651, 2418, 5373 -- <http://waterdata.usgs.gov/la/nwis/current/?type=flow>

Soil Porewater Salinity: Station number (P01, P02, P03): Discrete collections near the CRMS boardwalks: 1) intermittently throughout the year during hydro data sonde servicing and 2) twice annually during spring and fall RSET/accretion sampling. Collected at each vegetation station (10 herbaceous vegetation stations per CRMS site) during vegetation sampling in the late summer/early fall.

Herbaceous Vegetation: Station number (V01, V02, etc.): Species composition, percent cover, and dominant height once annually (late summer/early fall) at 10 stations per CRMS site. Plots are 2X2m.

Vertical Accretion (Station number (A01, A02, etc.)) & **Surface Elevation** (Station number E01 or E02): Collected twice annually (spring and fall) using cryo-coring and rod-surface elevation tables.

Swamp Forest:

- 1) Overstory Station number (F01, F02, etc.) (at least every 3 years): species composition and diameter at breast height (DBH) for woody shrubs and trees > 5 cm DBH in late summer/early fall. Canopy cover with a densiometer annually during herbaceous vegetation sampling. Plots are 20X20m.
- 2) Understory Station number (F01UNW, UC, USE, etc.) (every 3 years): species composition, height, DBH, stem density of woody shrubs and trees < 5 cm DBH (late summer/ early fall). Plots are 6X6m.
- 3) Swamp Herbaceous Vegetation Station number (F01VNW, VC, VSE, etc.) (annually in the late summer/early fall): same as for herbaceous vegetation as described above but at 9 stations per swamp CRMS site. Plots are 2X2m.

Soil Properties: Station number (S01, S02, etc): Collected upon site establishment and every 10 years in marshes and 6 years in swamps.

- pH, salinity, bulk density, soil moisture, percent organic matter, wet/dry volume

**Cheat Sheet:
Provided via
email (5/16/16)
and available in
the FAQ's on
home page**

Aerial photo

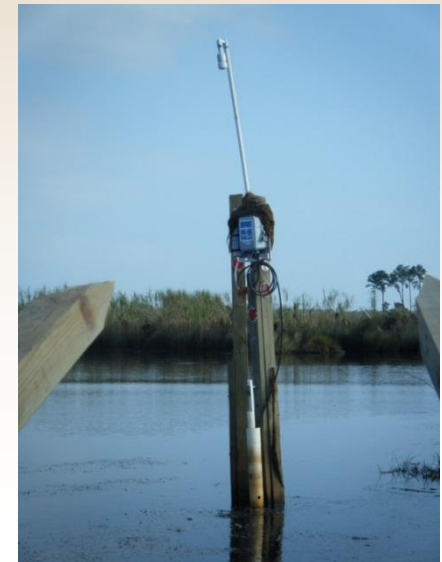
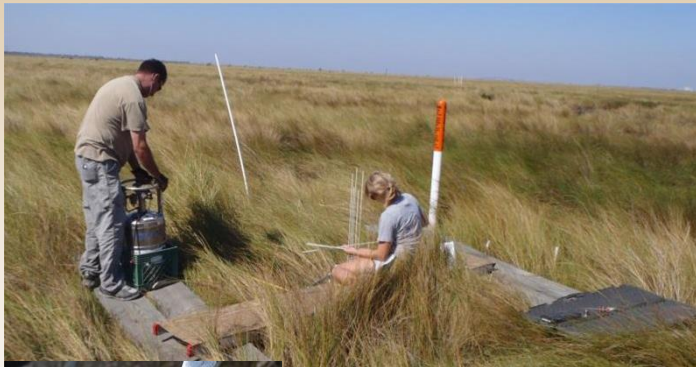
2005

2008

1km² scale:

High resolution aerial photography based land:water analyses to investigate land change through time.

200m² scale: Field data collection using standardized data collection protocols and consistent sampling intervals





Coastwide Reference Monitoring System – *Wetlands* Site Layout





Coastwide Reference Monitoring System – *Wetlands* Site Data Collection

Data Type	Parameter	Method	Scale	Frequency
Land change	Land:Water Ratio	Satellite Imagery	Hydrologic Basin	3 years
	Land:Water Ratio	Digital Aerial Photography	CRMS Site (1 km ²)	3 years
Vegetation	Emergent Vegetation	Braun Blanquet: % Cover, Species Richness, Height of Dominant Species	(10) 2m x 2m plots per marsh site or (9) plots per swamp sites	Annually during peak biomass
	Forested Vegetation	DBH, Canopy Cover, Understory veg	(3) 20m x 20m Forested plots & (9) 6m X6m Understory plots per site	3 yrs during peak biomass
Soils	Soil Characteristics	Core samples profiled into 4 cm increments to 24 cm. Bulk Density, OM%, Soil Salinity, pH, and Moisture.	3 cores, 18 archived samples per site	6 to 10 years
	Vertical Accretion	Feldspar Plots/Cryogenic Cores	3 plots per site	Twice per year
	Marsh Elevation Change	Rod Surface Elevation Table (RSET)	4 directions per site	Twice per year
Hydrology	Soil Porewater	10 and 30 cm syringe sippers	3 samples per depth per site and at vegetation plots	Variable and annually
	Surface Water Salinity, Temp and Water Level	Submersible Data Logger	in available water within 200m of CRMS site or in a well	Hourly



A STANDARD OPERATING PROCEDURES MANUAL FOR THE COAST-WIDE REFERENCE MONITORING SYSTEM-*WETLANDS*:

Methods for Site Establishment, Data Collection, and Quality
Assurance/Quality Control

Todd M. Folse, Jonathan L. West, Melissa K. Hymel, John P. Troutman,
Leigh A. Sharp, Dona Weifenbach, Tommy E. McGinnis, Laurie B.
Rodrigue, William M. Boshart, Danielle, C. Richardi, C. Mike Miller, and
W. Bernard Wood

The Louisiana Coastal Protection and Restoration Authority

- **QA/QC procedure for each data type**
- **Field procedures**
- **Data entry**
- **Initial data review**
- **Automated review during submission into database buffer**
- **CPRA regional office review**
- **Final approval and acceptance into CIMS database**



Coastwide Reference Monitoring System – *Wetlands* Database

lacoast.gov/crms

a CWPPRA funded project



Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program



Map Data FAQ Factsheet

Wetland restoration efforts conducted in Louisiana require monitoring the effectiveness of individual projects as well as monitoring the cumulative effects of all projects in restoring, creating, enhancing, and protecting the coastal landscape. The effectiveness of the traditional paired-reference monitoring approach in Louisiana has been limited because of difficulty in finding comparable test sites. CRMS is a multiple reference approach that uses aspects of hydrogeomorphic functional assessments and probabilistic sampling.


This approach includes a suite of sites that encompass the range of ecological conditions for each stratum, with projects placed on a continuum of conditions found for that stratum. Trajectories in reference sites are then compared with project trajectories through time. The approach could serve as a model for evaluating wetland ecosystems.



cims.coastal.louisiana.gov

cims.coastal.louisiana.gov

Apps Getting Started Latest Headlines Customize Links Free Hotmail RealPlayer Windows Marketplace Windows Media Windows Imported From Fire



Coastal Protection and Restoration Authority

Home Data Download Library Viewer Outreach Help




Welcome to the Louisiana Coastal Protection and Restoration Authority's Coastal Information Management System (CIMS).

CIMS provides geospatial, tabular database and document access to CPRA's suite of protection and restoration projects, Coastwide Reference Monitoring System (CRMS) stations, the 2012 Master Plan, project scheduling, geophysical data, and coastal community resiliency information.



Map Viewer Data Download Document Library



Coastal Protection and Restoration Authority

[Log In]

Home Data Download Library Viewer Outreach Help

DOWNLOAD DATA - HYDROGRAPHIC MONTHLY

Hydrographic data are now available in two general formats: data collected monthly and data collected hourly. Parameters sampled generally include: water level, water temperature, specific conductance, and salinity. In some rare instances water velocity and wind speed/wind direction are sampled at stations where hourly data are collected.

Monthly hydrographic data can be downloaded either by project, CRMS (Coastwide Reference Monitoring System) site, or station number. These files are relatively small, as there are only approximately 12 records per station per year. In general, there is a much larger spatial distribution of stations where monthly data are collected than where hourly data are collected. Note: for CRMS stations, these monthly data comprise Soil Porewater data.

This screen defines a request for Monthly data. The data that matches this request will be returned real-time in a grid view and will provide an option to download a comma delimited file with user provide file name, please see disclaimer below.

Enter Selection Criteria:

☒ Filter by Projects ☐ Filter by CRMS Sites

For a detailed explanation of all data types and collection frequencies, please review the [Data Descriptions](#) document.


(Select either a Project Name or a CRMS Site to get a list of filtered Stations.)

Project:

Stations:

From Date (mm/dd/yyyy):

To Date (mm/dd/yyyy):



Coastal Protection and Restoration Authority

[Log In]

Home Data Download Library Viewer Outreach Help

Monitoring Data

Hydrographic Data

Hydrographic data are now available in two general formats: data collected monthly and data collected hourly. Parameters sampled generally include: water level, water temperature, specific conductance, and salinity. In some rare instances water velocity and wind speed/wind direction are sampled at stations where hourly data are collected.

Hydrographic Monthly Data

[Retrieve Monthly Data](#)

Monthly hydrographic data can be downloaded either by project, CRMS (Coastwide Reference Monitoring System) site, or station number. These files are relatively small, as there are only approximately 12 records per station per year. In general, there is a much larger spatial distribution of stations where monthly data are collected than where hourly data are collected. Note: for CRMS stations, these monthly data comprise Soil Porewater data.

Hydrographic Hourly Data

[Retrieve Hourly Data](#)

Hourly hydrographic data may also be downloaded either by project, CRMS (Coastwide Reference Monitoring System) site, or station number; however these files are much larger than the monthly files. For example, since one year of hourly sampling will yield approximately 8,760 records, a file for a project collecting data at 3 stations for a period of 5 years will contain approximately 131,400 records. Many typical spreadsheet programs will not be able to completely open a file of this size. For this reason, we recommend that hourly data be downloaded by station and not by project. Data are not necessarily available for download from all stations. However, if you would like to request data that are not currently available from the database, an alternate request option is available (see Other Data, below).

Accretion Data

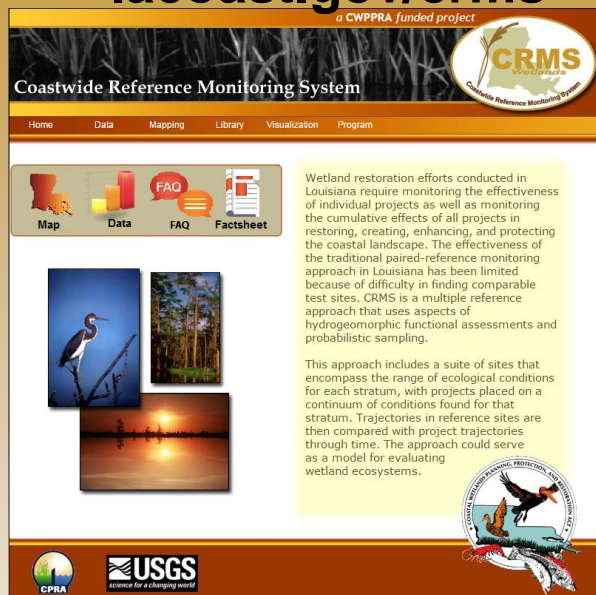
[Retrieve Accretion Data](#)

Accretion data can be downloaded either by project, CRMS (Coastwide Reference Monitoring System) site, or station number. These data are collected from specific locations within herbaceous marsh vegetation areas and forested swamp/bottomland hardwood vegetation areas, and are collected at 6 months and 12 months after monitoring station establishment. Accretion measurements show rates of soil accretion or soil erosion at a location.

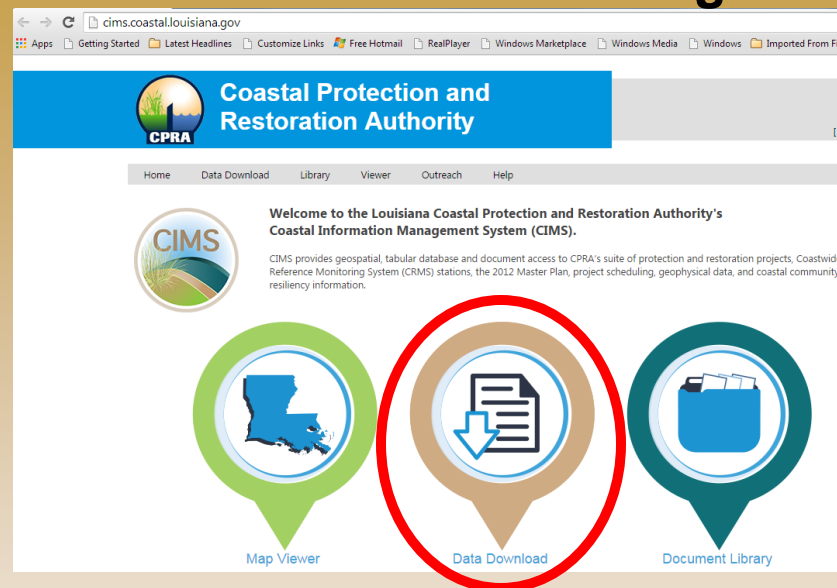


Coastwide Reference Monitoring System – *Wetlands* Database

lacoast.gov/crms



cims.coastal.louisiana.gov

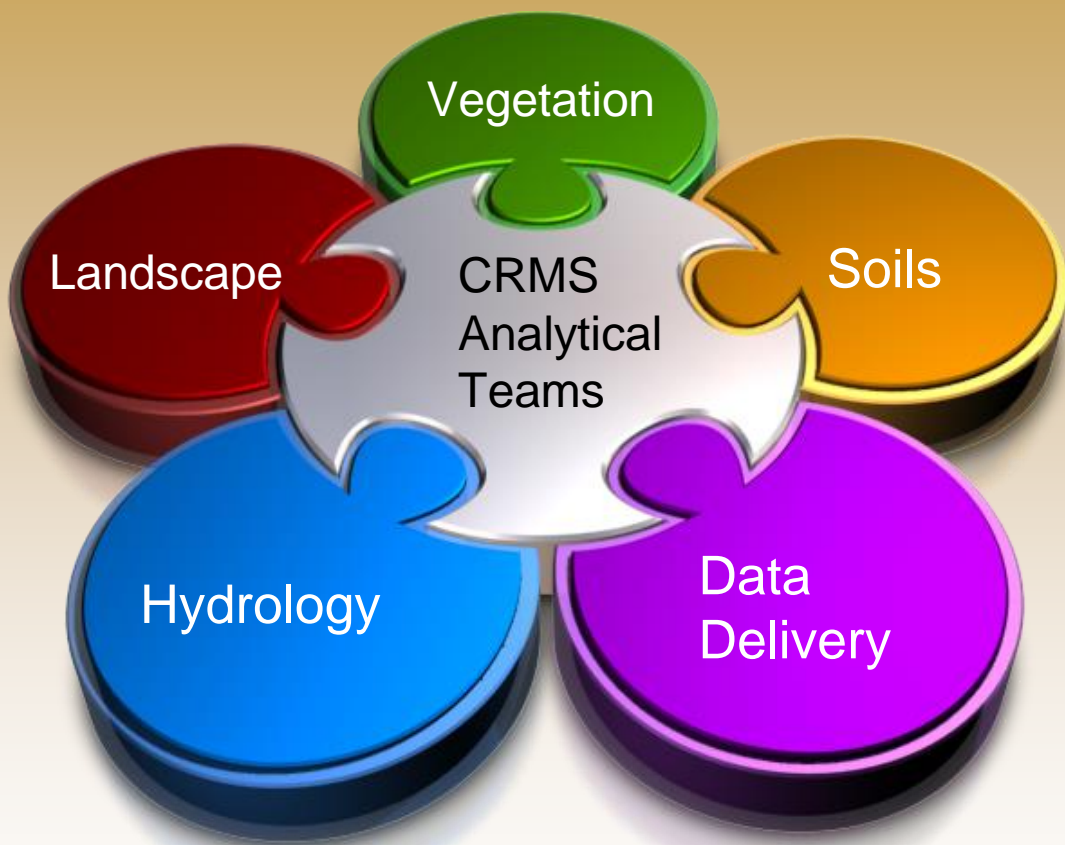


CRMS Data Records:

Continuous Hydro – 52.5 million
Marsh Veg - 320K
Surface Elevation - 197K
Discrete Hydro - 150K
Forested Veg - 50K
Accretion - 30K
Soils - 7K



Coastwide Reference Monitoring System – *Wetlands* Analytical Teams



- Federal and State Scientists
- Academics
- WARC's Advanced Applications Team
- Oversight by CWPPRA Monitoring Work Group

www.lacoast.gov/crms



Coastwide Reference Monitoring System – Wetlands Analytical Teams

a CWPRA funded project



Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program



Wetland restoration efforts conducted in Louisiana require monitoring the effectiveness of individual projects as well as monitoring the cumulative effects of all projects in restoring, creating, enhancing, and protecting the coastal landscape. The effectiveness of the traditional paired-reference monitoring approach in Louisiana has been limited because of difficulty in finding comparable test sites. CRMS is a multiple reference approach that uses aspects of hydrogeomorphic functional assessments and probabilistic sampling.

This approach includes a suite of sites that encompass the range of ecological conditions for each stratum, with projects placed on a continuum of conditions found for that stratum. Trajectories in reference sites are then compared with project trajectories through time. The approach could serve as a model for evaluating wetland ecosystems.



www.lacoast.gov/crms

- Web mapping viewer
- Summarize and visualize data at multiple scales
- On-the-fly user defined graphics and tools
- Simple queries and data downloads
- Develop multi-metric ecological indices
- Develop report card
- Continually evolving
- Google Chrome

Vegetation:

- **Floristic Quality Index (FQI)** used to determine wetland quality based on plant species composition.

Hydrology:

- **Hydrologic Index (HI)** assesses the suitability of average salinity and percent time flooded in maximizing vegetation primary productivity.

Soils:

- **Submergence Vulnerability Index (SVI)** assesses the vulnerability of a site to submergence based on its elevation relative to ESLR.



Coastwide Reference Monitoring System (CRMS)

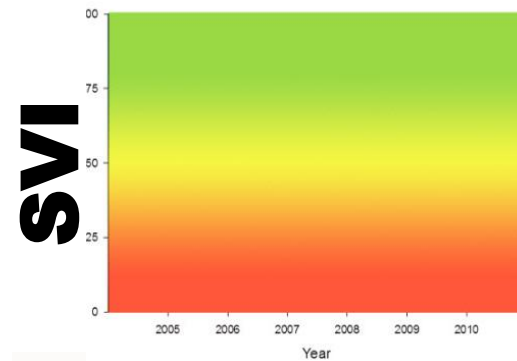
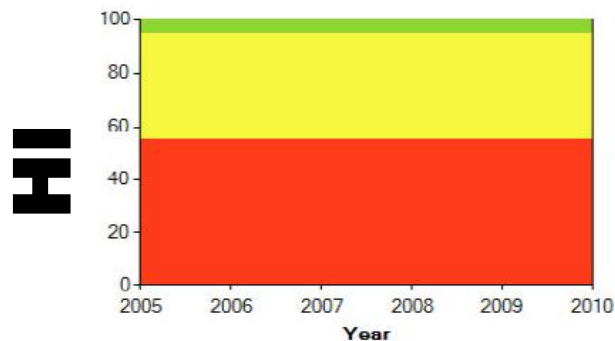
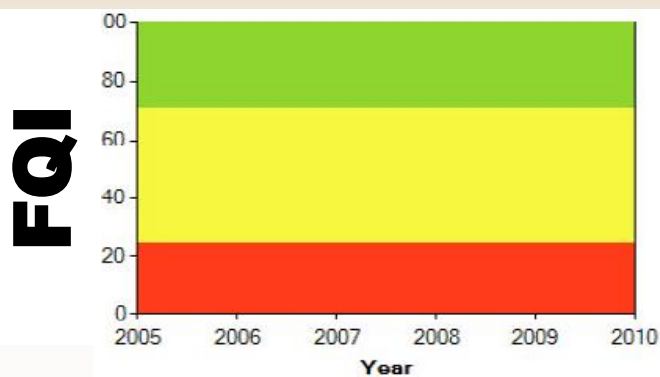
Site Level Report Card

Site: CRMS0672

Year: 2014



- **Developed using CRMS dataset**
 - **2006-2009**
- **Good (>75%), fair (25-50%), poor (<25%)**
- **Category thresholds vary by index**
- **SVI is a continuous scale without defined thresholds**





Coastwide Reference Monitoring System – *Wetlands*

Website Navigation



- Main menu with a series of submenus
- Largely self explanatory
- Will focus on most used features



Coastwide Reference Monitoring System – Wetlands Site Navigation

a CWPRA funded project



Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

**Map****Data****FAQ****Factsheet**

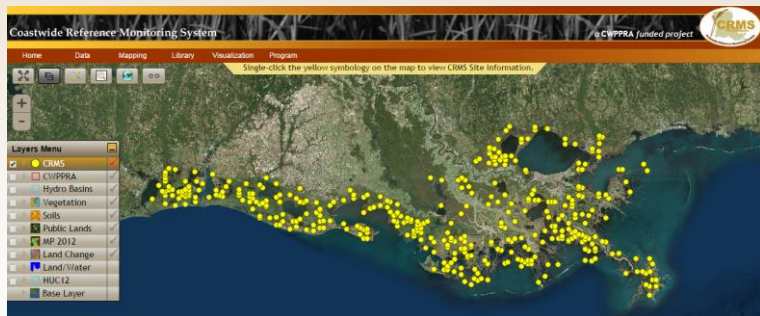
Wetland restoration efforts conducted in Louisiana require monitoring the effectiveness of individual projects as well as monitoring the cumulative effects of all projects in restoring, creating, enhancing, and protecting



Data



Charting



Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

Previous Charting Version

Charting Bulk Charting **Data Download** Reporting

Data Download

Data available through this website are calculated or derived values based on the original data which are available from the CIMS database ([CIMS](#))

- Hydro
- Vegetation
- Soil
- Spatial

Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

Previous Charting Version

Charting Bulk Charting Data Download Reporting

- Hydro
- Vegetation
- Soil
- Spatial
- Report Card Charts

Clear Charts



Coastwide Reference Monitoring System – Wetlands Site Navigation

a CWPRA funded project

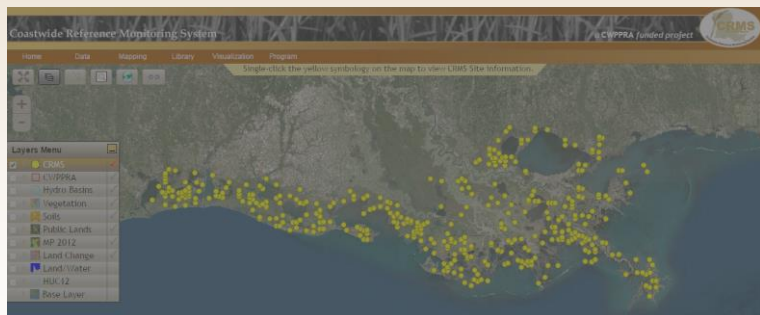
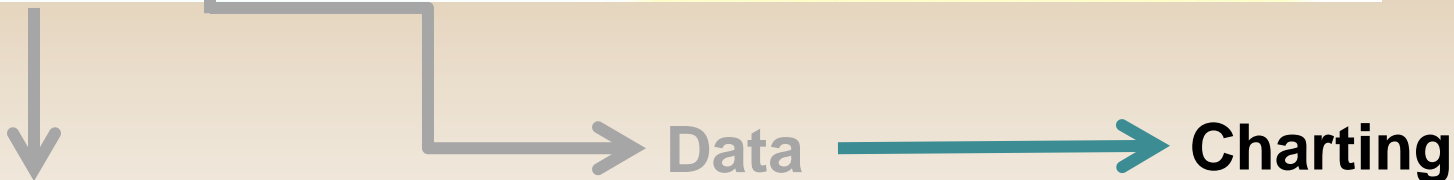


Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

**Map****Data****FAQ****Factsheet**

Wetland restoration efforts conducted in Louisiana require monitoring the effectiveness of individual projects as well as monitoring the cumulative effects of all projects in restoring, creating, enhancing, and protecting



Coastwide Reference Monitoring System

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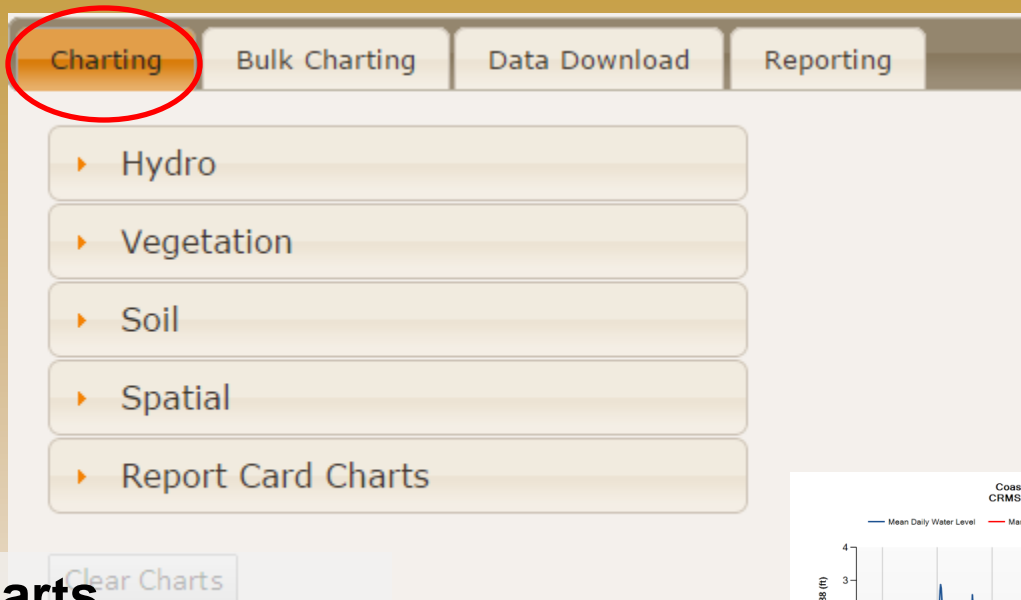
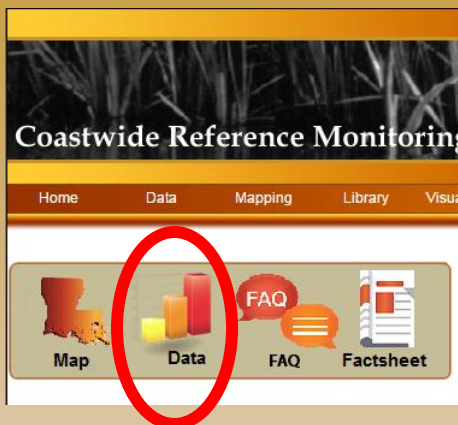
Charting Bulk Charting Data Download Reporting

- Hydro
- Vegetation
- Soil
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- Report Card Charts

Clear Charts

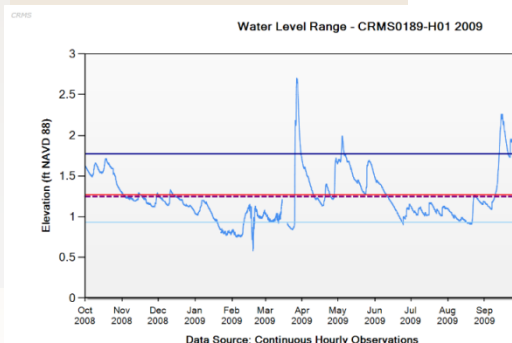
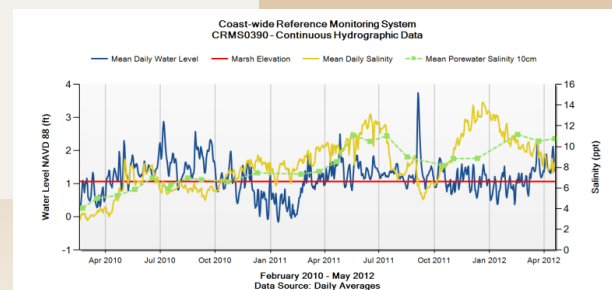


Coastwide Reference Monitoring System – Wetlands Using the Charting Interface

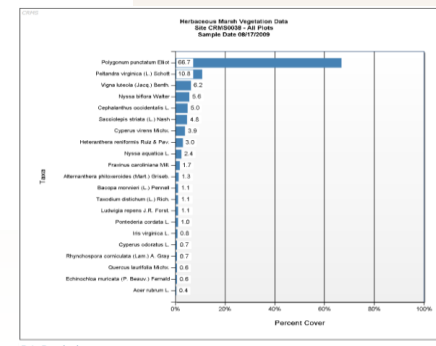


Charts...Lots of Charts

- Surface Elevation/Accretion
- % Organic / Bulk Density
- Vegetation
- Forested
- Porewater
- Hydrographic (Salinity, Temp, Water Level)
- Precipitation
- Report Card



[Data Download](#)



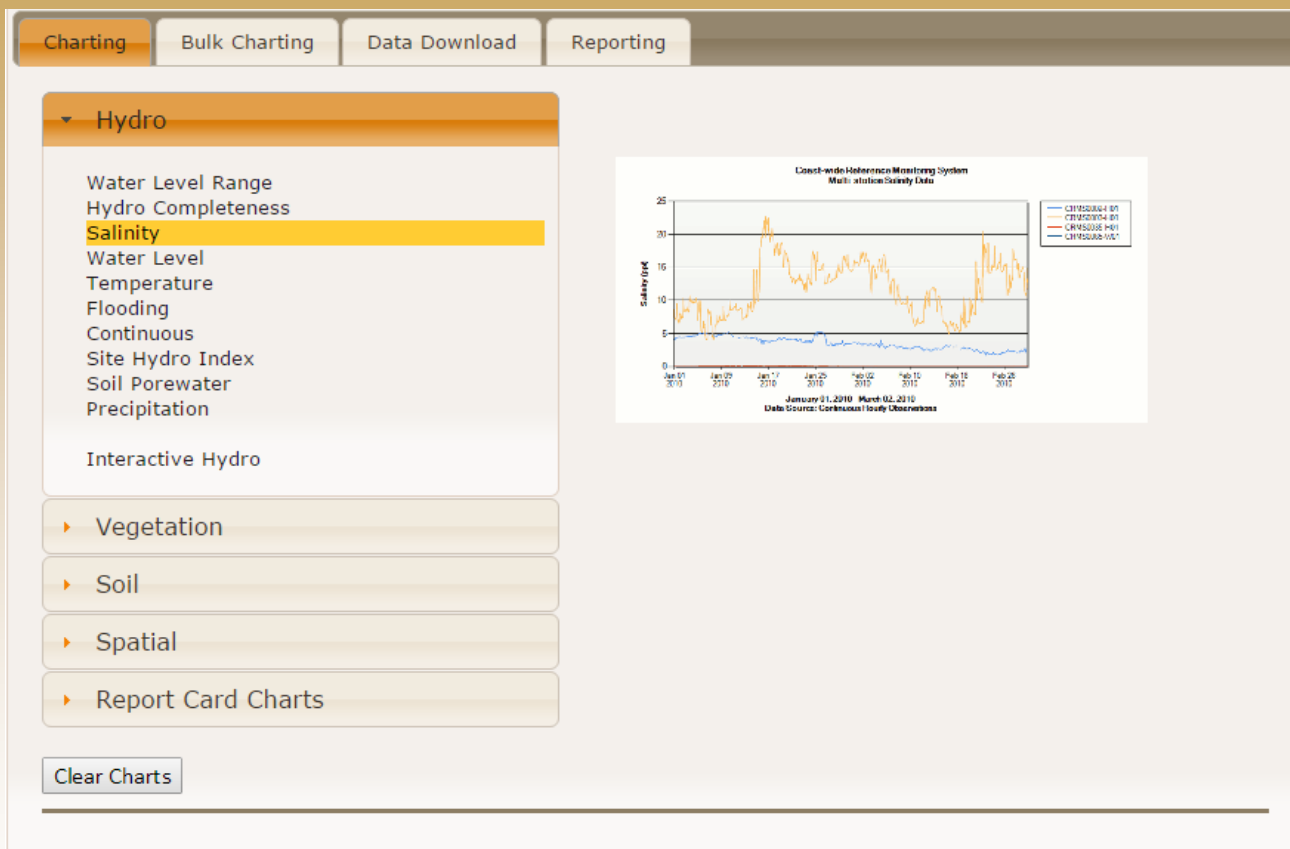
[Data Download](#)



Coastwide Reference Monitoring System – *Wetlands*

Using the Charting Interface

1. Pick a Data Category
Hydro
2. Pick a Parameter
Salinity





Coastwide Reference Monitoring System – *Wetlands* Using the Charting Interface

1. Pick a Data Category
Hydro
2. Pick a Parameter
Salinity
3. Pick a Scale
Station
4. Enter Start / End Dates
1/1/2001
12/31/2011
Apply Date Filter

The screenshot shows the CRMS Charting Interface. At the top, there are four tabs: "Charting" (selected), "Bulk Charting", "Data Download", and "Reporting". Below the tabs, on the left, is a list of data categories: "Hydro" (expanded), "Vegetation", "Soil", "Spatial", and "Report Card Charts". Under "Hydro", the parameters listed are "Water Level Range", "Hydro Completeness", "Salinity" (highlighted), "Water Level", "Temperature", "Flooding", "Continuous", "Site Hydro Index", "Soil Porewater", "Precipitation", and "Interactive Hydro". On the right, the "Water Year" is set to "October 1 - September 30". The "Scale" is set to "Station". The "Date Range" is "1/1/1992 - 5/12/2016". The "Min Date" is "01/01/2001" and the "Max Date" is "12/31/2011". Below these fields is an "Apply Date" button and a calendar widget showing the month of "Dec" for the year "2011". The calendar grid shows the days of the week (Su, Mo, Tu, We, Th, Fr, Sa) and the dates 1 through 31. The date "31" is highlighted in orange. At the bottom left of the interface is a "Clear Charts" button.

Charting Bulk Charting Data Download Reporting

Water Year is October 1 - September 30

Scale: Station

Date Range:
1/1/1992 - 5/12/2016
Min Date: 01/01/2001
Max Date: 12/31/2011
Apply Date

Dec 2011

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3						
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Clear Charts



Coastwide Reference Monitoring System – *Wetlands* Using the Charting Interface

1. Pick a Data Category
Hydro
2. Pick a Parameter
Salinity
3. Pick a Scale
Station
4. Enter Start / End Dates
1/1/2001
12/31/2011
Apply Date Filter
5. Pick Station
Submit Request

A screenshot of the CRMS Charting Interface. The interface has a top navigation bar with tabs: "Charting" (selected), "Bulk Charting", "Data Download", and "Reporting". On the left, a "Hydro" category is expanded, showing a list of parameters: "Water Level Range", "Hydro Completeness", "Salinity" (highlighted), "Water Level", "Temperature", "Flooding", "Continuous", "Site Hydro Index", "Soil Porewater", "Precipitation", and "Interactive Hydro". Below this are expandable sections for "Vegetation", "Soil", "Spatial", and "Report Card Charts", each with a "Clear Charts" button. On the right, the "Water Year" is set to "October 1 - September 30". The "Scale" is set to "Station". The "Date Range" is "1/1/1992 - 5/12/2016". The "Min Date" is "01/01/2001" and the "Max Date" is "12/31/2011". There is an "Apply Date Filter" button with an information icon. Below this are two checkboxes: "Mean annual salinity" and "Mean growing season salinity". A list of station IDs is shown, with "CRMS0156-H01" selected. At the bottom right, there is a checkbox for "Include major weather\storm events" and a link "Show Map Selector". A "Submit Request" button is at the bottom right.



Coastwide Reference Monitoring System – *Wetlands* Using the Charting Interface

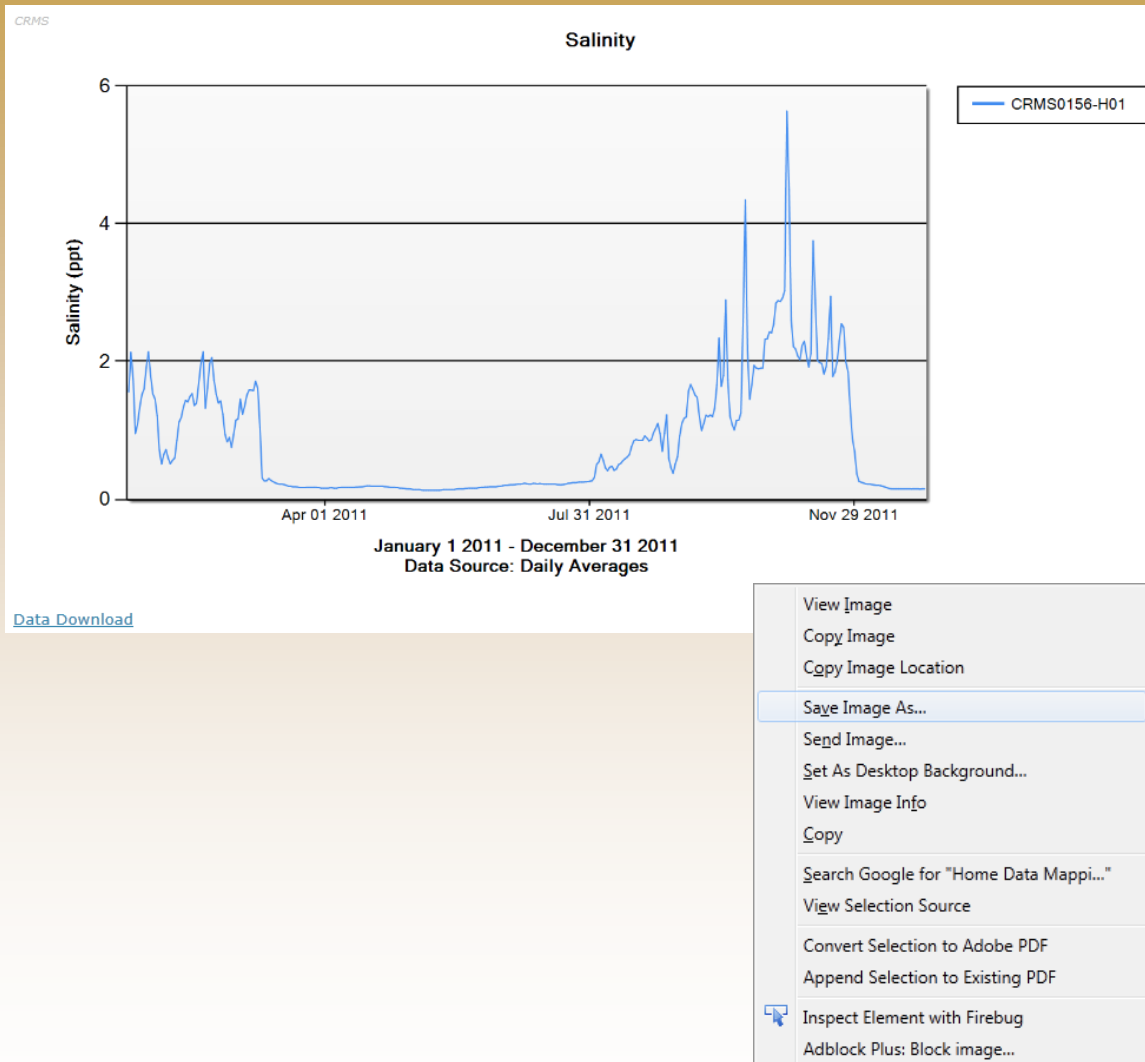
1. Pick a Data Category
Hydro
2. Pick a Parameter
Salinity
3. Pick a Scale
Station
4. Enter Start / End Dates
1/1/2001
12/31/2011
Apply Date Filter
5. Pick Station
Submit Request

The screenshot shows the CRMS Charting Interface. At the top, there are four tabs: "Charting", "Bulk Charting", "Data Download", and "Reporting". The "Charting" tab is active. Below the tabs, there is a "Hydro" category dropdown menu. Under "Hydro", there is a list of parameters: "Water Level Range", "Hydro Completeness", "Salinity" (which is highlighted), "Water Level", "Temperature", "Flooding", "Continuous", "Site Hydro Index", "Soil Porewater", and "Precipitation". Below this list is an "Interactive Hydro" link. To the right of the parameter list, there is a "Scale" dropdown menu set to "Station". Below the scale, there is a "Date Range" section with "Date Range: 1/1/1992 - 5/12/2016", "Min Date: 01/01/2001", and "Max Date: 12/31/2011". There is an "Apply Date Filter" button with an information icon. Below the date filter, there are two checkboxes: "Mean annual salinity" and "Mean growing season salinity". To the right of these checkboxes, there is a list of station IDs: "CRMS0131-H01", "CRMS0132-H01", "CRMS0135-H01", "CRMS0136-H01", "CRMS0139-H01", "CRMS0146-H01", "CRMS0147-H01", "CRMS0148-H01", "CRMS0151-H01", "CRMS0153-H01", "CRMS0154-H01", and "CRMS0156-H01". Below the station list, there is a "Clear Charts" button. At the bottom right, there is a checkbox for "Include major weather\storm eve" and a "Show Map Select" link. A "Submit Request" button is at the bottom right. A red circle highlights a line chart titled "Salinity" showing data for station "CRMS0131-H01" from "Apr 01 2001" to "December 30 2011". The chart shows a fluctuating line representing salinity over time.



Coastwide Reference Monitoring System – *Wetlands* Using the Charting Interface

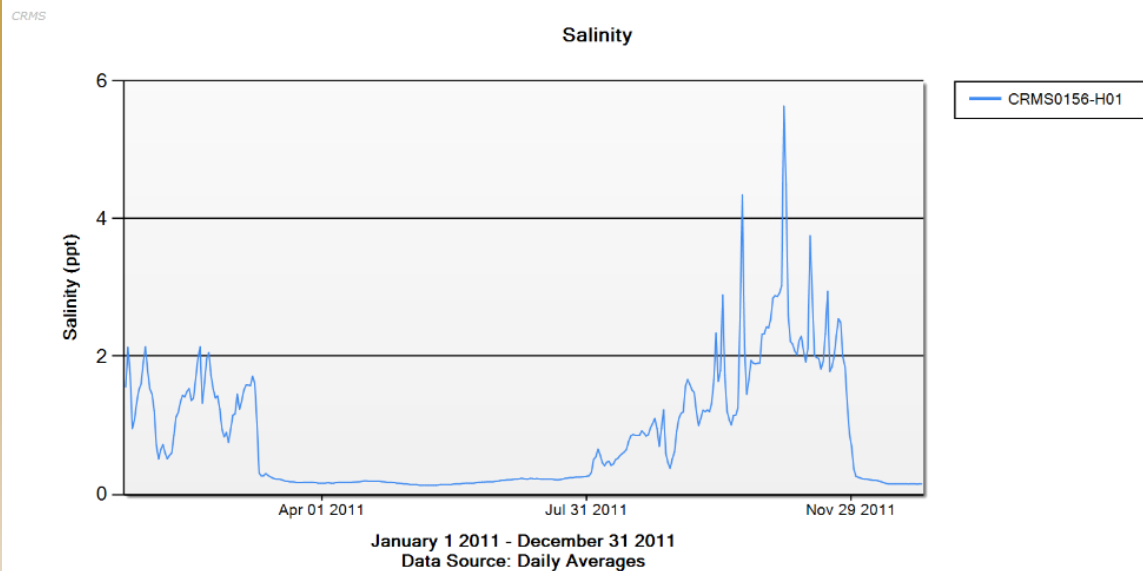
1. Pick a Data Category
 1. Hydro
2. Pick a Parameter
 1. Salinity
3. Pick a Scale
 1. Site
4. Enter Start / End Dates
 1. 1/1/2001
 2. 12/31/2011
 3. Apply Date Filter
5. Pick Site
6. View Chart
7. Save Chart Image





Coastwide Reference Monitoring System – *Wetlands* Using the Charting Interface

1. Pick a Data Category
Hydro
2. Pick a Parameter
Salinity
3. Pick a Scale
Station
4. Enter Start / End Dates
1/1/2001
12/31/2011
Apply Date Filter
5. Pick Station
6. Save Chart Image
7. View Chart
8. Download Data (optional)



[Data Download](#)

MultiStationChart_Salinity_201271013184495.csv-0.csv - Microsoft Excel

	A1		Station_ID		
	A	B	C	D	E
1	Station_ID	MonDate	Salinity	Water_Level	Water_Temperature
2	CRMS0156-H01	1/1/2011 0:00	1.560417	1.8325	9.65125
3	CRMS0156-H01	1/2/2011 0:00	2.130833	1.62625	12.42083
4	CRMS0156-H01	1/3/2011 0:00	1.746667	1.434167	8.210417
5	CRMS0156-H01	1/4/2011 0:00	0.95375	1.350417	7.404583
6	CRMS0156-H01	1/5/2011 0:00	1.085833	1.344167	7.54125
7	CRMS0156-H01	1/6/2011 0:00	1.333333	1.408333	7.622083
8	CRMS0156-H01	1/7/2011 0:00	1.514583	1.237083	7.506667
9	CRMS0156-H01	1/8/2011 0:00	1.60125	1.127917	7.66375
10	CRMS0156-H01	1/9/2011 0:00	1.908333	1.9775	8.087916
11	CRMS0156-H01	1/10/2011 0:00	2.137083	1.900417	11.25458
12	CRMS0156-H01	1/11/2011 0:00	1.789583	1.528333	8.947917
13	CRMS0156-H01	1/12/2011 0:00	1.529583	1.18125	6.955
14	CRMS0156-H01	1/13/2011 0:00	1.455417	1.05125	6.779583
15	CRMS0156-H01	1/14/2011 0:00	1.21125	0.9725	6.984583
16	CRMS0156-H01	1/15/2011 0:00	0.7083333	1.16	6.829583



Multi-Station Charting- Plots data from multiple stations on the same chart

Pick a Data Category
Hydro

Pick a Parameter
Water Level

Pick a Scale
Multi Station

Enter Start / End Dates
1/1/2001
12/31/2011

Apply Date Filter

Pick Stations

ChartingBulk ChartingData DownloadReporting

Hydro

Water Level RangeHydro CompletenessSalinityWater LevelTemperatureFloodingContinuousSite Hydro IndexSoil PorewaterPrecipitationInteractive Hydro

VegetationSoilSpatialReport Card Charts

Clear Charts

Water Year is October 1 - September 30

Scale: Multi Station

Date Range: 1/1/1992 - 5/12/2016

Min Date: 01/01/2001

Max Date: 12/31/2005

Apply Date Filter

Basin: Calcasieu/SabinProject: All Projects

Selection limited to 10 items

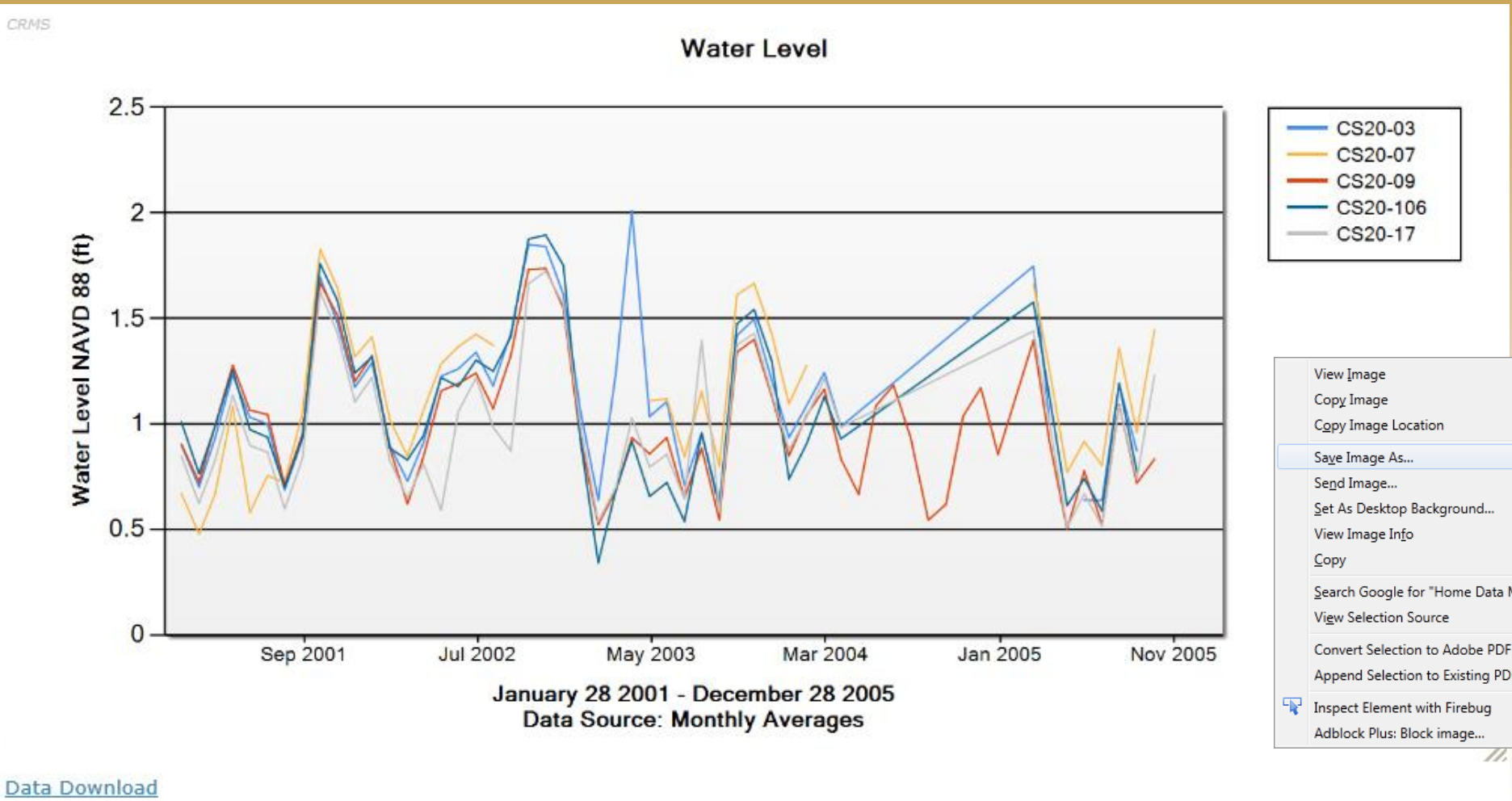
CS20	
CS20-106	CS20-03
CS20-14R	CS20-07
CS20-15R	CS20-09
	CS20-17

OptionsSelections

☐ Include major weather\storm events
[Show Map Selector](#)

Submit Request

Multi-Station Water Level Chart





Coastwide Reference Monitoring System – *Wetlands* Pairing the Charting Interface with the Map Selector

“Map Selector” allows chart stations to be picked in a mapping interface.

Great if you have an area of interest, but don’t know the station IDs.

The screenshot shows the "Charting" tab of the CRMS interface. On the left, a sidebar menu under the "Hydro" category lists various data types: "Water Level Range", "Hydro Completeness", "Salinity" (highlighted with a red arrow), "Water Level", "Temperature", "Flooding", "Continuous", "Site Hydro Index", "Soil Porewater", "Precipitation", and "Interactive Hydro". Below this are expandable sections for "Vegetation", "Soil", "Spatial", and "Report Card Charts", along with a "Clear Charts" button.

The main content area on the right is titled "Water Year is October 1 - September 30". It includes a "Scale:" dropdown set to "Multi Station", a "Date Range:" section with "1/1/1992 - 5/12/2016", and input fields for "Min Date:" (1/1/1992) and "Max Date:" (5/12/2016). An "Apply Date Filter" button with an information icon is present. Below these are "Basin:" and "Project:" dropdowns, both set to "All".

A section titled "Selection limited to 10 items" displays a list of station IDs: AT04-01, AT04-02, AT04-03, AT04-04, AT04-06, BA01-01, BA01-02, BA01-03, and BA01-04. To the right of this list is a large empty box for a map. At the bottom right, there is a checkbox for "Include major weather\storm events" and a link "Show Map Selector" which is circled in red. A "Submit Request" button is at the very bottom.



Coastwide Reference Monitoring System – *Wetlands*

Pairing the Charting Interface with the Map Selector

Select Mode - Drag the Mouse inside the map to select stations.



■ CRMS Stations

■ CWPPRA Stations

Clear Selected

Submit

BA01-02

BA01-03

Show Map Selector

Submit Request



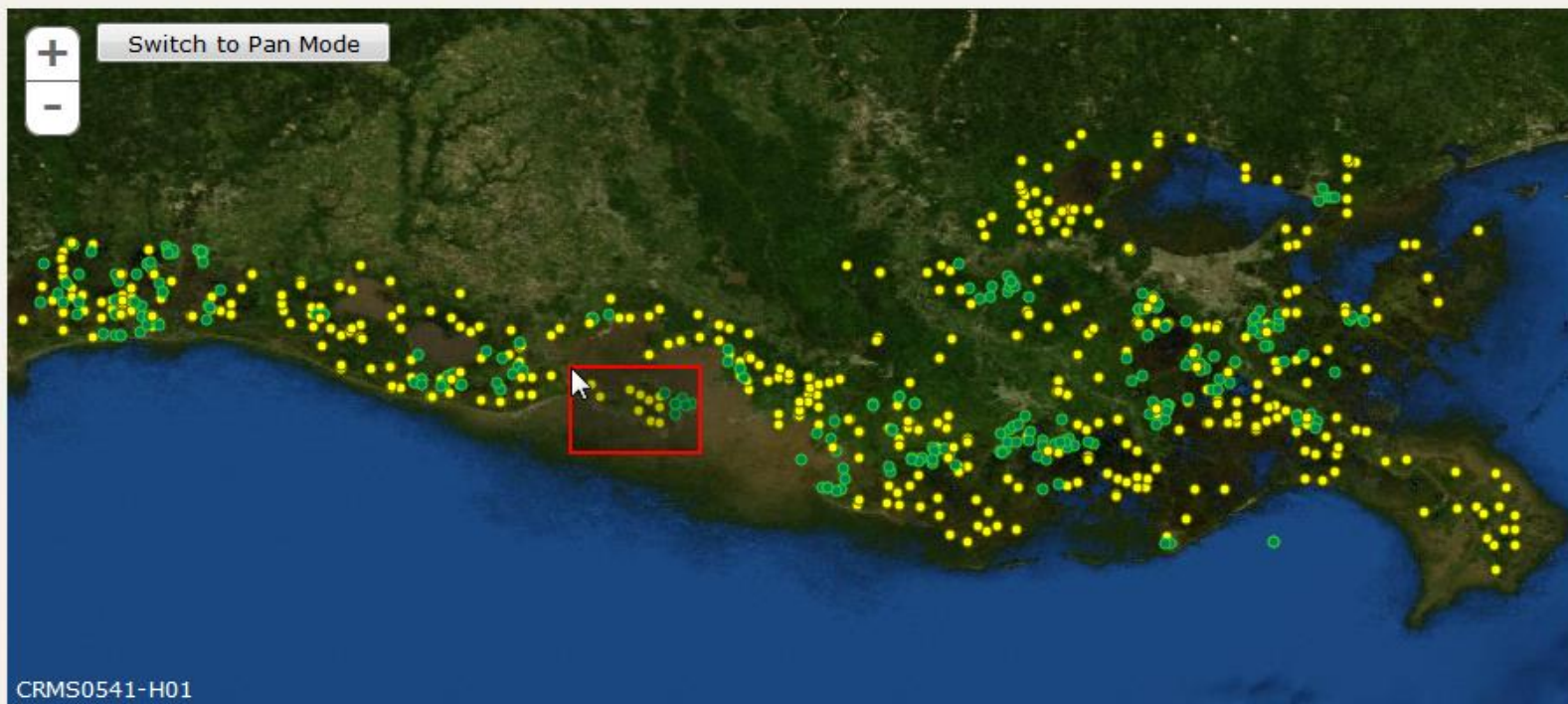


Coastwide Reference Monitoring System – *Wetlands*

Pairing the Charting Interface with the Map Selector

[Previous Charting Version](#)

Select Mode - Drag the Mouse inside the map to select stations.



● CRMS Stations

● CWPPRA Stations

Clear Selected

Submit

BA01-02

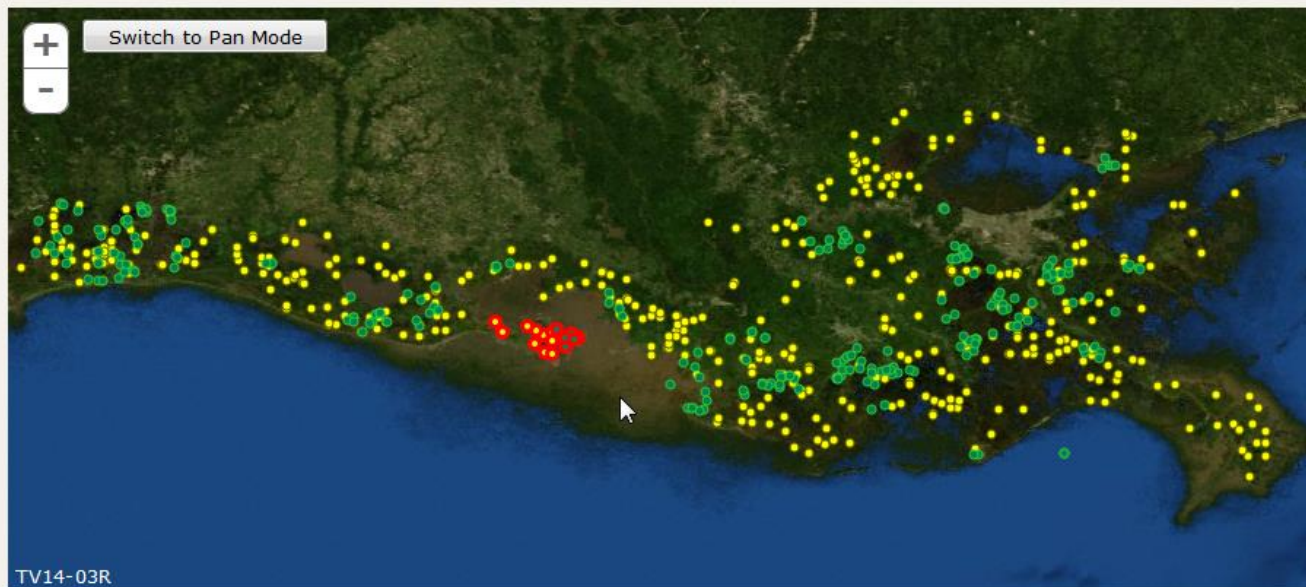
BA01-03

☐ Include major weather\storm events



Coastwide Reference Monitoring System – *Wetlands* Pairing the Charting Interface with the Map Selector

Select Mode - Drag the Mouse inside the map to select stations.



■ CRMS Stations ■ CWPPRA Stations

Clear Selected

Submit

BA01-02

CRMS0524-W01

BA01-03

CRMS0529-H01

[Show Map Selector](#)

Submit Request





Coastwide Reference Monitoring System – *Wetlands*

Pairing the Charting Interface with the Map Selector

The sites/stations that were selected on the map appear in the right side of the selection box.

Charting

Bulk Charting

Data Download

Reporting

Hydro

Water Level Range

Hydro Completeness

Salinity

Water Level

Temperature

Flooding

Continuous

Site Hydro Index

Soil Porewater

Precipitation

Interactive Hydro

Vegetation

Soil

Spatial

Report Card Charts

Clear Charts

Water Year is October 1 - September 30

Scale: Multi Station

Date Range:
1/1/1992 - 5/12/2016

Min Date: 1/1/1992

Max Date: 5/12/2016

Apply Date Filter

Basin: All Basins

Project: All Projects

Selection limited to 10 items

AT04-01	CRMS0498-H01
AT04-02	CRMS0499-H01
AT04-03	CRMS0504-H01
AT04-04	CRMS0520-H01
AT04-06	CRMS0522-W01
BA01-01	CRMS0523-H01
BA01-02	CRMS0524-W01
BA01-03	CRMS0529-H01
BA01-04	CRMS0530-W01

☐ Include major weather\storm events

Show Map Selector

Submit Request



Coastwide Reference Monitoring System – *Wetlands* Pairing the Charting Interface with the Map Selector

Filter the list by a Basin!!

Charting

Bulk Charting

Data Download

Reporting

▼ Hydro

Water Level Range

Hydro Completeness

Salinity

Water Level

Temperature

Flooding

Continuous

Site Hydro Index

Soil Porewater

Precipitation

Interactive Hydro

▶ Vegetation

▶ Soil

▶ Spatial

▶ Report Card Charts

Clear Charts

Water Year is October 1 - September 30

Scale: Multi Station ▼

Date Range:
1/1/1992 - 5/12/2016

Min Date: 1/1/1992

Max Date: 5/12/2016

Apply Date Filter ⓘ

Basin: All Basins ▼

Project: All Projects ▼

Selection

AT04-01

AT04-02

AT04-03

AT04-04

AT04-05

AT04-06

AT04-07

AT04-08

AT04-09

AT04-10

AT04-11

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AT04-809

AT04-810

AT04-811

AT04-812

AT04-813

AT04-814

AT04-815

AT04-816

AT04-817

AT04-818

AT04-819

AT04-820

AT04-821

AT04-822

AT04-823

AT04-824

AT04-825

AT04-826

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AT04-830

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AT04-983

AT04-984

AT04-985

AT04-986

AT04-987

AT04-988

AT04-989

AT04-990

AT04-991

AT04-992

AT04-993

AT04-994

AT04-995

AT04-996

AT04-997

AT04



Coastwide Reference Monitoring System – *Wetlands*

Pairing the Charting Interface with the Map Selector


[Previous Charting Version](#)

Select Mode - Drag the Mouse inside the map to select stations. ✕

+

-

Switch to Pan Mode



● CRMS Stations ● CWPPRA Stations

CRMS0162-H01

CRMS0163-H01

CRMS0164-H01

Clear Selected

Submit

☐ Include major weather\storm events



Coastwide Reference Monitoring System – *Wetlands* Using the Interactive Hydro Charting Interface

Interactive Hydro Chart

Great for hydro **data exploration** without having to download data.

Charting

Bulk Charting

Data Download

Reporting

Hydro

Water Level Range

Hydro Completeness

Salinity

Water Level

Temperature

Flooding

Continuous

Site Hydro Index

Soil Porewater

Precipitation

Interactive Hydro

Vegetation

Soil

Spatial

Report Card Charts

Clear Charts

Water Year is October 1 - September 30

Scale: Multi Station

Date Range:
1/1/1992 - 5/12/2016

Min Date: 01/01/2001

Max Date: 12/31/2005

Apply Date Filter

Basin: Calcasieu/Sabin

Project: All Projects

Selection limited to 10 items

CS20	
CS20-106	CS20-03
CS20-14R	CS20-07
CS20-15R	CS20-09
	CS20-17

☐ Include major weather\storm events

Show Map Selector

Submit Request



Coastwide Reference Monitoring System – *Wetlands* Using the Interactive Hydro Charting Interface

Great for data discovery, fast manipulation, and comparison of sites without having to generate charts.

Stations Parameters Colors

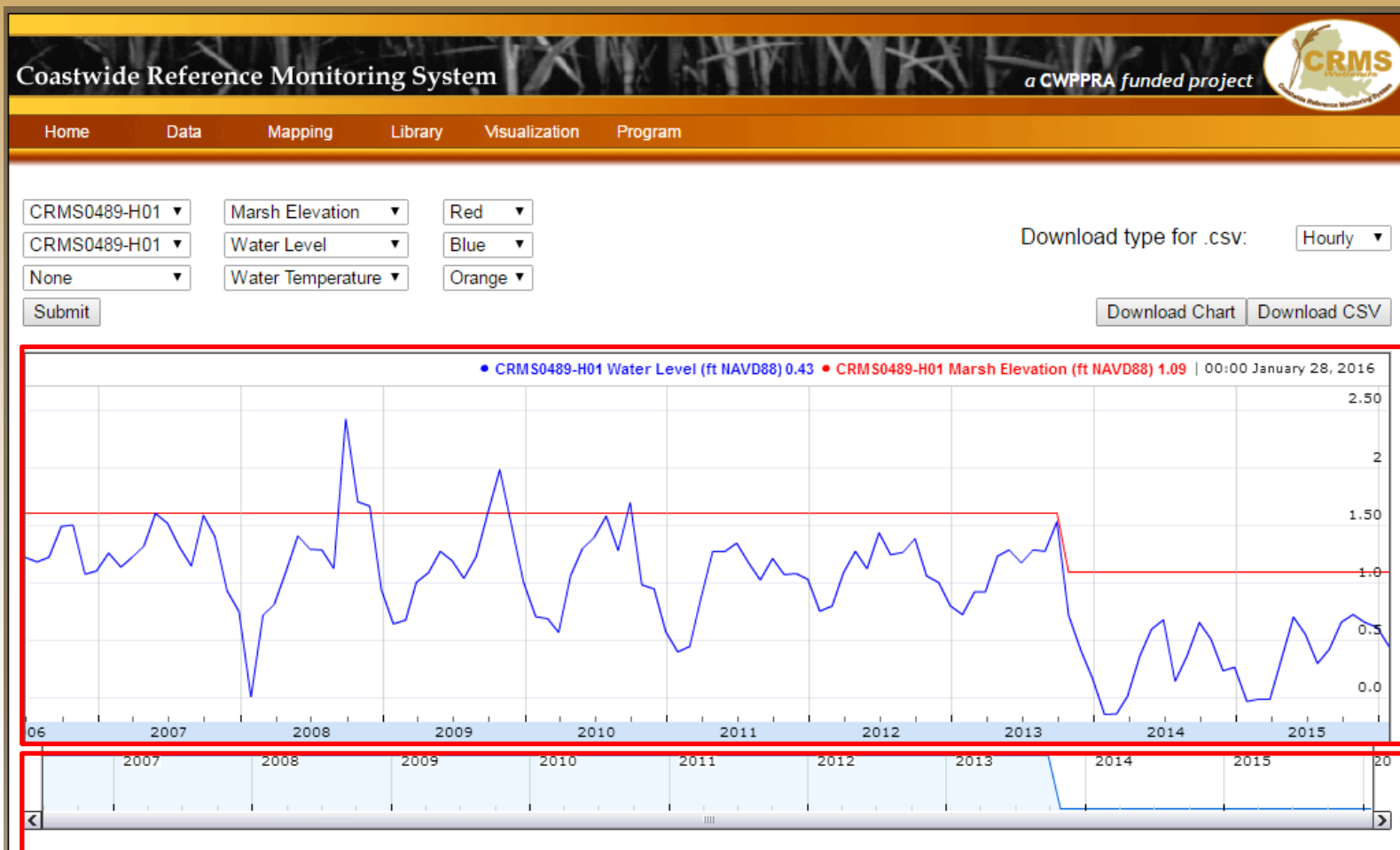
The screenshot shows the web interface for the CRMS Wetlands system. At the top, there is a banner with the text "Coastwide Reference Monitoring System" and "a CWPPRA funded project" on the right. Below the banner is a navigation bar with links: Home, Data, Mapping, Library, Visualization, and Program. Three blue arrows point from the labels "Stations", "Parameters", and "Colors" to the "Mapping", "Visualization", and "Program" links respectively. Below the navigation bar, there are three columns of dropdown menus. The first column (Stations) has three "None" options. The second column (Parameters) has "Salinity", "Water Level", and "Water Temperature". The third column (Colors) has "Red", "Blue", and "Orange". A "Submit" button is located at the bottom left of the form.

Stations	Parameters	Colors
None ▼	Salinity ▼	Red ▼
None ▼	Water Level ▼	Blue ▼
None ▼	Water Temperature ▼	Orange ▼
<input type="button" value="Submit"/>		



Coastwide Reference Monitoring System – *Wetlands* Using the Interactive Hydro Charting Interface

Same site with multiple parameters



Charted data
for POR

Period of record
(POR)

NOTE: Water elevations prior to Oct. 1, 2013 are GEOID99 and GEOID12a thereafter



Coastwide Reference Monitoring System – Wetlands Using the Interactive Hydro Charting Interface

Same site with multiple parameters

Frequency Type



Data availability time extent:

- Window can slide along time line
- Changing window size controls temporal accuracy of chart



Coastwide Reference Monitoring System – Wetlands Using the Interactive Hydro Charting Interface



Coastwide Reference Monitoring System

a CWPRA funded project

Home

Data

Mapping

Library

Visualization

Program

CRMS0489-H01 ▼

Marsh Elevation ▼

Red ▼

CRMS0489-H01 ▼

Water Level ▼

Blue ▼

None ▼

Water Temperature ▼

Orange ▼

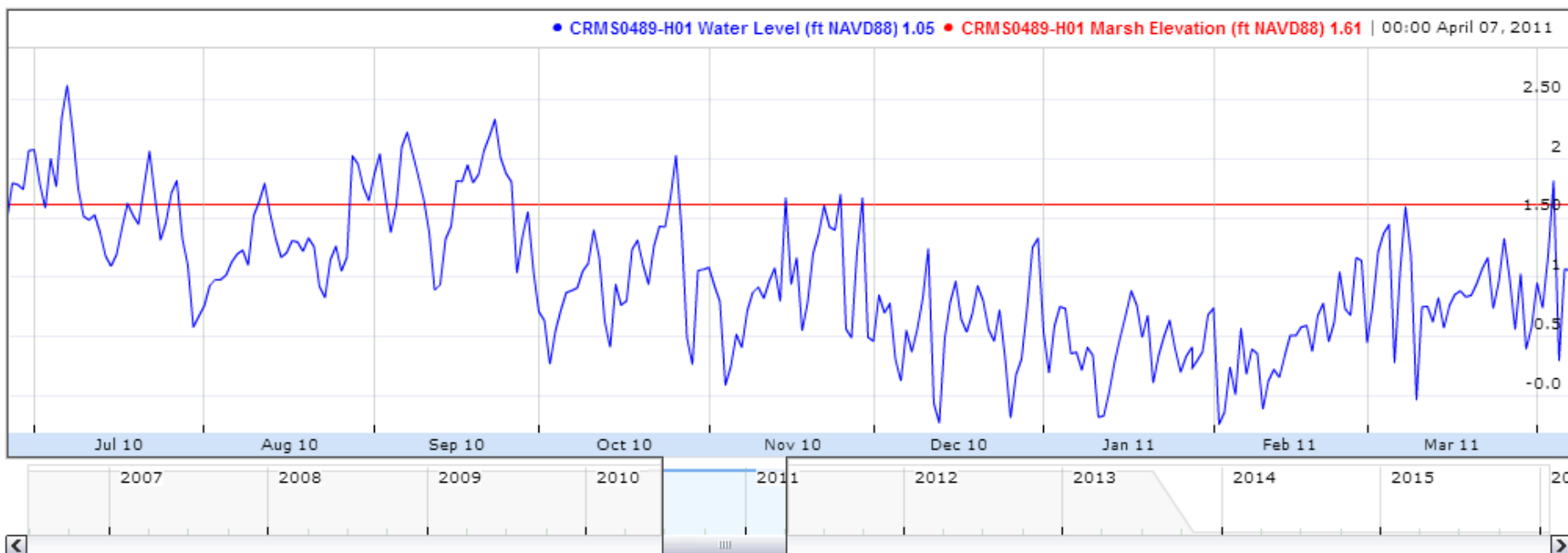
Submit

Download type for .csv:

Hourly ▼

Download Chart

Download CSV



NOTE: Water elevations prior to Oct. 1, 2013 are GEOID99 and GEOID12a thereafter



Coastwide Reference Monitoring System – Wetlands Using the Interactive Hydro Charting Interface

Multiple sites with the same parameter

Coastwide Reference Monitoring System

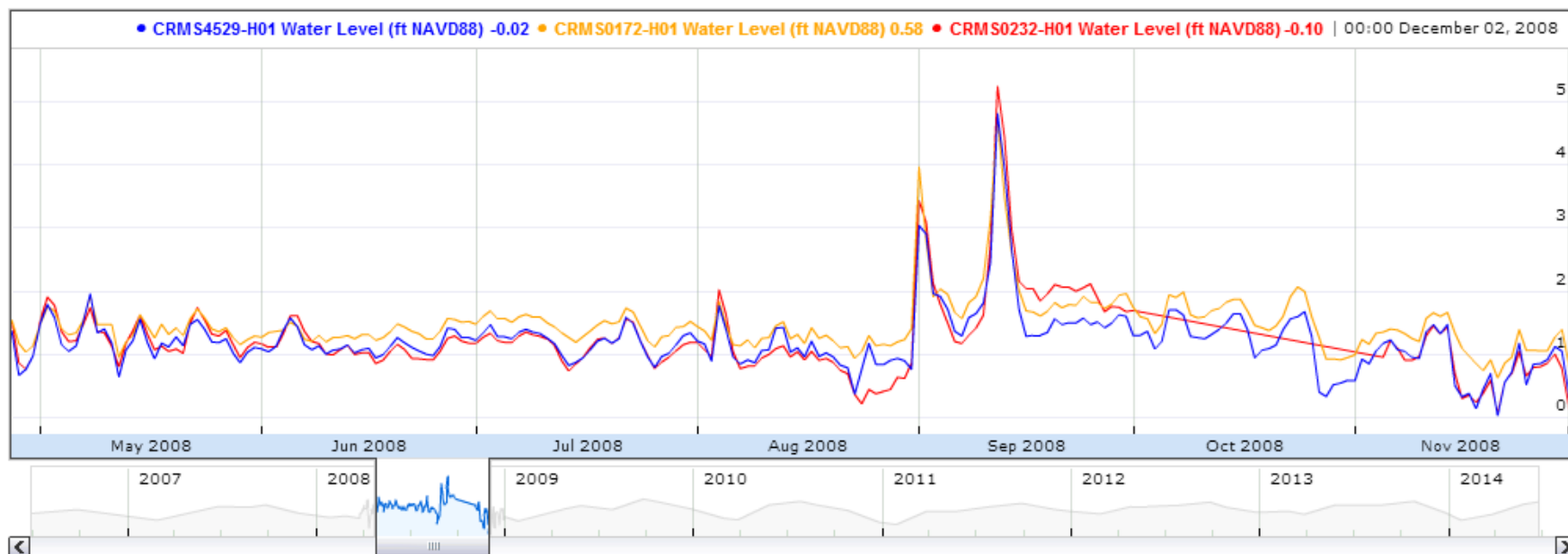
a CWPPRA funded project



Home Data Mapping Library Visualization Program

CRMS0232-H01 ▼	Water Level ▼	Red ▼
CRMS4529-H01 ▼	Water Level ▼	Blue ▼
CRMS0172-H01 ▼	Water Level ▼	Orange ▼
<input type="button" value="Submit"/>		

Download type:

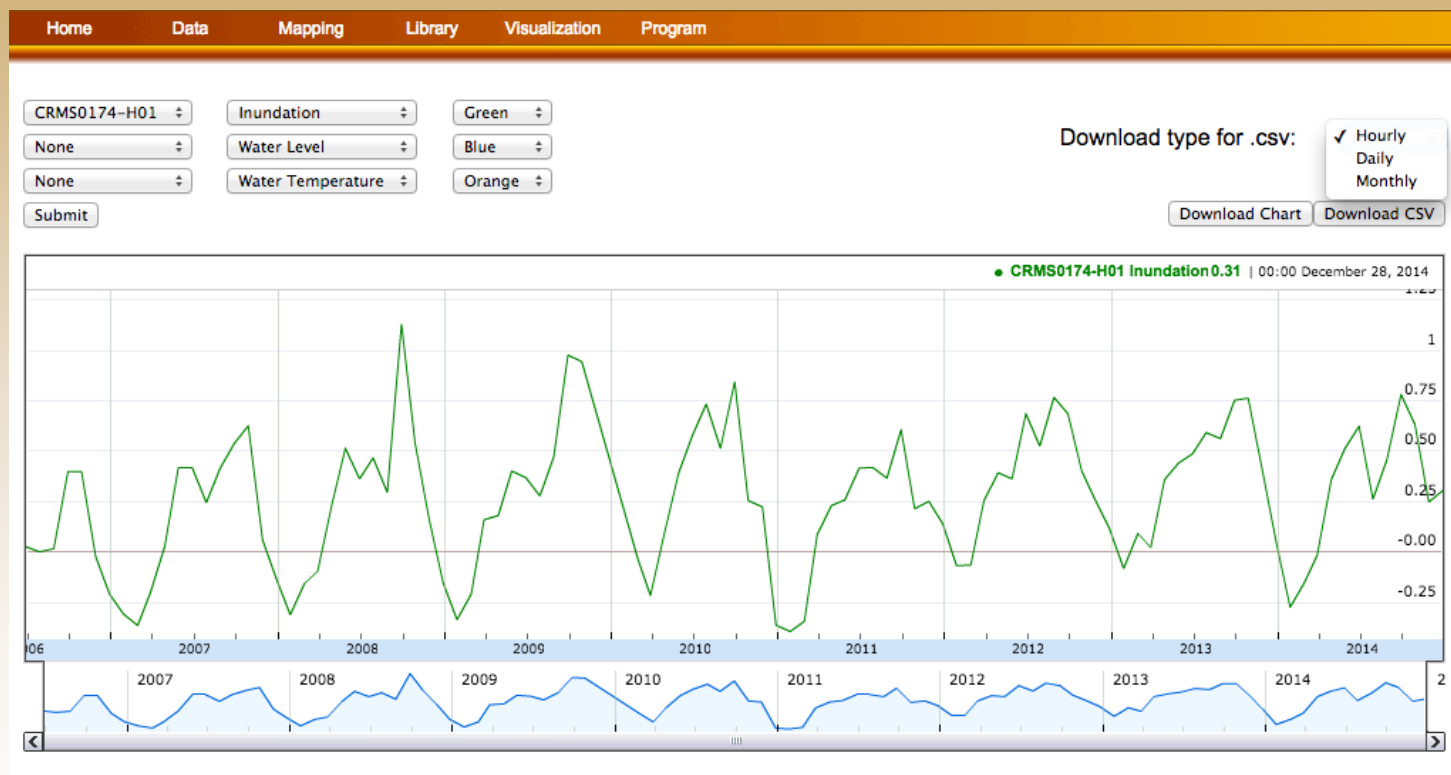




Coastwide Reference Monitoring System – *Wetlands* Using the Interactive Hydro Charting Interface

Downloading

- Set time frequency of data (i.e., hourly, daily, monthly)
- Data in CSV format

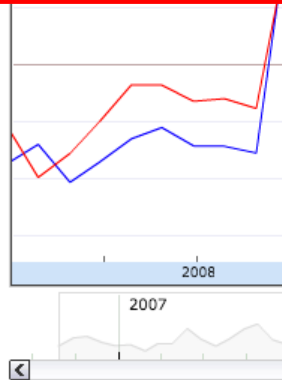




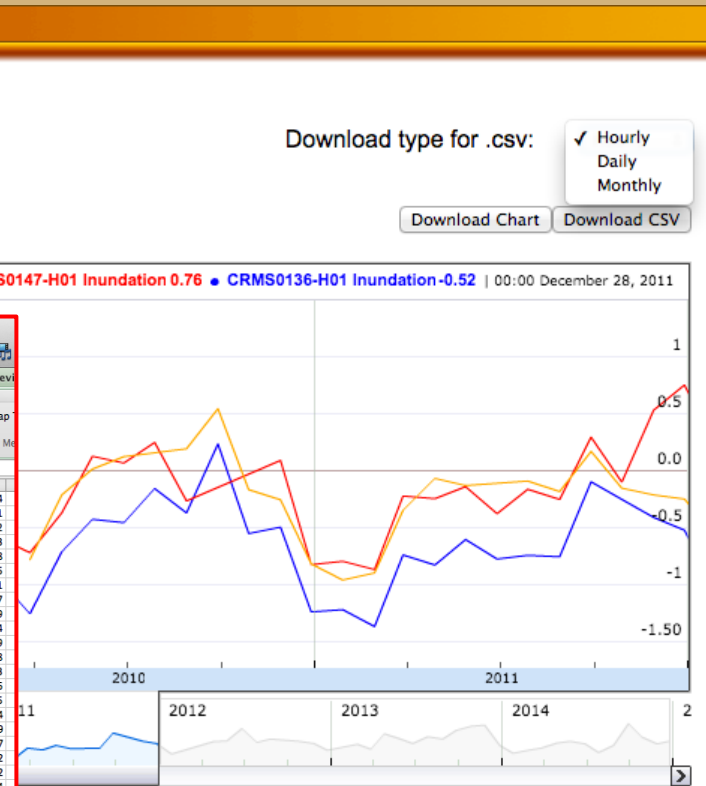
Coastwide Reference Monitoring System – *Wetlands* Using the Interactive Hydro Charting Interface

Downloaded CSV

	A	B	C	D	E
1	Date	Station One	Station One Type	Station One Value	
2	6/8/06 11:00	CRMS0174-H01	Inundation	0.27	
3	6/8/06 12:00	CRMS0174-H01	Inundation	0.12	
4	6/8/06 13:00	CRMS0174-H01	Inundation	-0.05	
5	6/8/06 14:00	CRMS0174-H01	Inundation	-0.22	
6	6/8/06 15:00	CRMS0174-H01	Inundation	-0.39	
7	6/8/06 16:00	CRMS0174-H01	Inundation	-0.5	
8	6/8/06 17:00	CRMS0174-H01	Inundation	-0.63	
9	6/8/06 18:00	CRMS0174-H01	Inundation	-0.66	
10	6/8/06 19:00	CRMS0174-H01	Inundation	-0.69	
11	6/8/06 20:00	CRMS0174-H01	Inundation	-0.68	
12	6/8/06 21:00	CRMS0174-H01	Inundation	-0.58	
13	6/8/06 22:00	CRMS0174-H01	Inundation	-0.45	
14	6/8/06 23:00	CRMS0174-H01	Inundation	-0.27	
15	6/9/06 0:00	CRMS0174-H01	Inundation	-0.13	
16	6/9/06 1:00	CRMS0174-H01	Inundation	0.05	
17	6/9/06 2:00	CRMS0174-H01	Inundation	0.19	
18	6/9/06 3:00	CRMS0174-H01	Inundation	0.33	
19	6/9/06 4:00	CRMS0174-H01	Inundation	0.46	
20	6/9/06 5:00	CRMS0174-H01	Inundation	0.55	



	A	B	C	D	E
74740	12/17/14 13:00	CRMS0174-H01	Inundation	0.24	
74741	12/17/14 14:00	CRMS0174-H01	Inundation	0.41	
74742	12/17/14 15:00	CRMS0174-H01	Inundation	0.52	
74743	12/17/14 16:00	CRMS0174-H01	Inundation	0.63	
74744	12/17/14 17:00	CRMS0174-H01	Inundation	0.68	
74745	12/17/14 18:00	CRMS0174-H01	Inundation	0.75	
74746	12/17/14 19:00	CRMS0174-H01	Inundation	0.81	
74747	12/17/14 20:00	CRMS0174-H01	Inundation	0.87	
74748	12/17/14 21:00	CRMS0174-H01	Inundation	0.89	
74749	12/17/14 22:00	CRMS0174-H01	Inundation	0.84	
74750	12/17/14 23:00	CRMS0174-H01	Inundation	0.69	
74751	12/18/14 0:00	CRMS0174-H01	Inundation	0.48	
74752	12/18/14 1:00	CRMS0174-H01	Inundation	0.33	
74753	12/18/14 2:00	CRMS0174-H01	Inundation	0.16	
74754	12/18/14 3:00	CRMS0174-H01	Inundation	0.05	
74755	12/18/14 4:00	CRMS0174-H01	Inundation	-0.04	
74756	12/18/14 5:00	CRMS0174-H01	Inundation	-0.09	
74757	12/18/14 6:00	CRMS0174-H01	Inundation	-0.17	
74758	12/18/14 7:00	CRMS0174-H01	Inundation	-0.22	
74759	12/18/14 8:00	CRMS0174-H01	Inundation	-0.2	
74760	12/18/14 9:00	CRMS0174-H01	Inundation	-0.14	
74761	12/18/14 10:00	CRMS0174-H01	Inundation	-0.08	
74762	12/18/14 11:00	CRMS0174-H01	Inundation	0.05	
74763	12/18/14 12:00	CRMS0174-H01	Inundation	0.18	
74764					





Bulk Charting: creates multiple charts with the same parameter input

Great for creating figures for reports that all need to be uniformly designed.

Charting

Bulk Charting

Data Download

Reporting

Bulk Charting

▼ Hydro

Water Level Range

Hydro Completeness

Salinity

Water Level

Temperature

Flooding

Continuous

Site Hydro Index

Soil Porewater

Precipitation

▶ Vegetation

▶ Soil

▶ Spatial

▶ Report Card Charts

Water Year is October 1 - September 30

Scale:

Station ▼

Date Range:
1/1/1992 - 5/12/2016

Min Date:

01/01/2001

Max Date:

12/31/2005

Apply Date Filter

Basin:

Calcasieu/Sabin ▼

 Project:

CS-20 ▼

Select All	Deselect All
CS20-14R	CS20-03
CS20-15R	CS20-07
	CS20-09
	CS20-106
	CS20-17

you@email.com

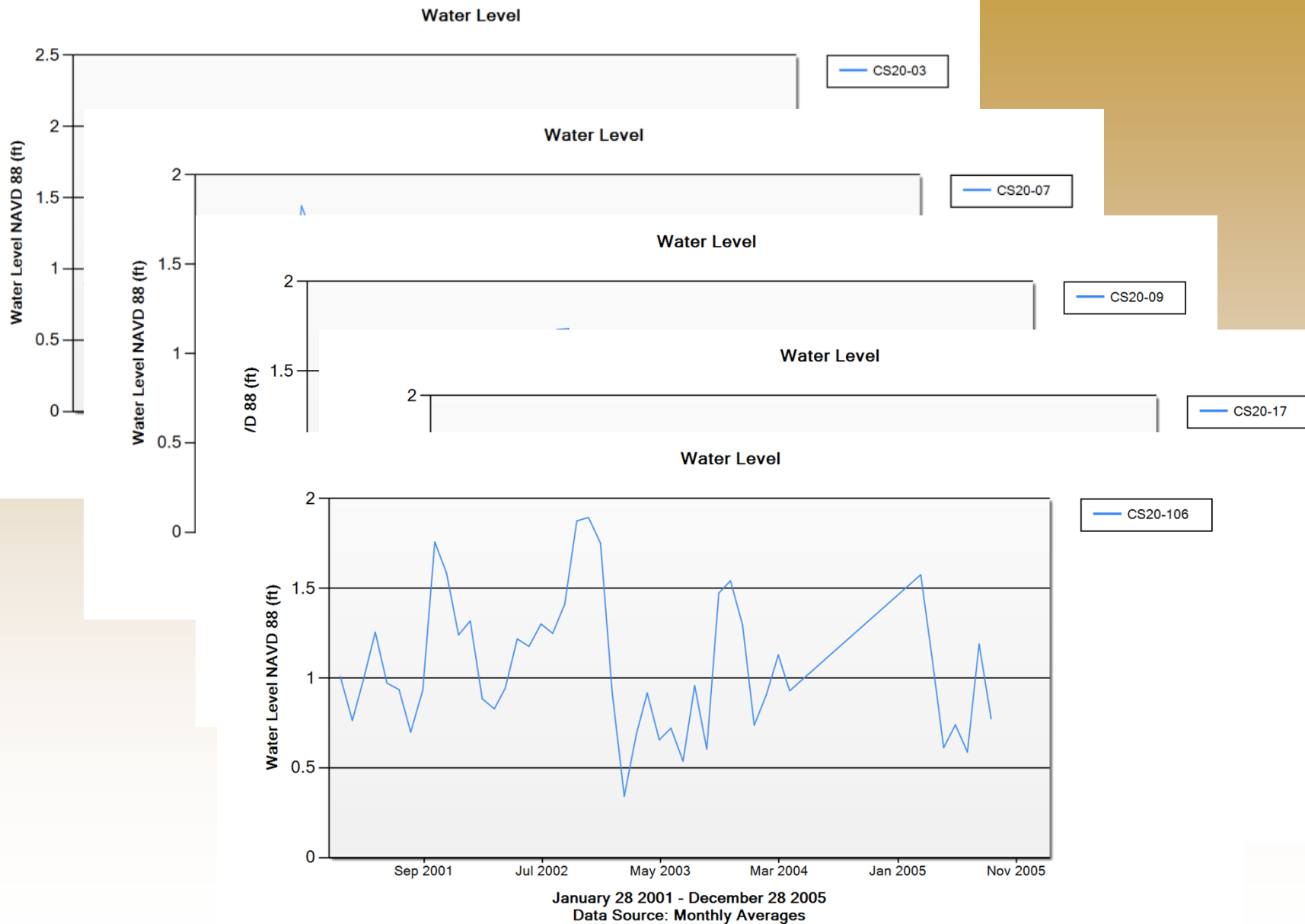
Show Map Selector

Submit Request



Coastwide Reference Monitoring System – *Wetlands*

Bulk Charting





Coastwide Reference Monitoring System – Wetlands Bulk Charting

Charting

Bulk Charting

Data Download

Reporting

Bulk Charting

Hydro

Vegetation

Forested

Herbaceous

Site Floristic Quality Index

Project/Reference FQI

Marsh Class

Volume Vegetation Index

Soil

Spatial

Report Card Charts

Basin: All Basins

Project: All Projects

Select All	Deselect All
BA39-01	CRMS0647
BA39-02	CRMS0655
BA39-03	CRMS0672
CRMS0002	
CRMS0003	
CRMS0006	
CRMS0008	
CRMS0030	
CRMS0000	

Choose Colors

Cancel

☒

 Spartina patens

☐

 Phragmites australis

☐

 Typha latifolia

☐

 Typha domingensis

☐

 Distichlis spicata

☐

 Schoenoplectus robustus

☐

 Paspalum vaginatum

☐

 Amaranthus bigelovii

☐

 Paspalum distichum

☐

 Symphyotrichum subulatum

☐

 Other

Show Map Selector

Submit Request

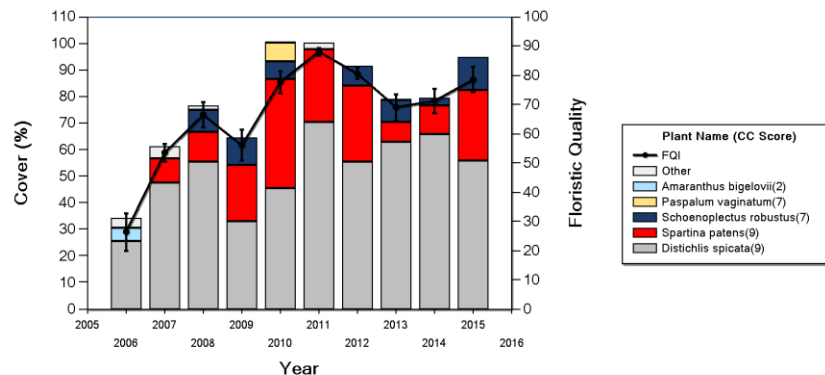
piazzas@usgs.gov

Site Floristic Quality Index:

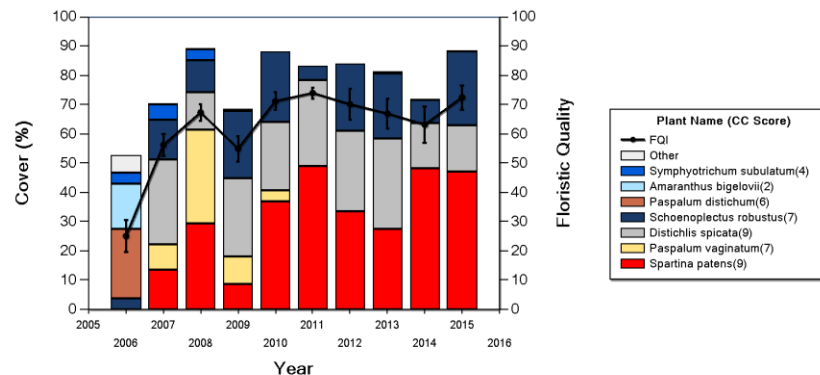
User can define color ramp for species of interest in all charts generated by one request.

Great for looking at species presence/absence or tracking invasive species

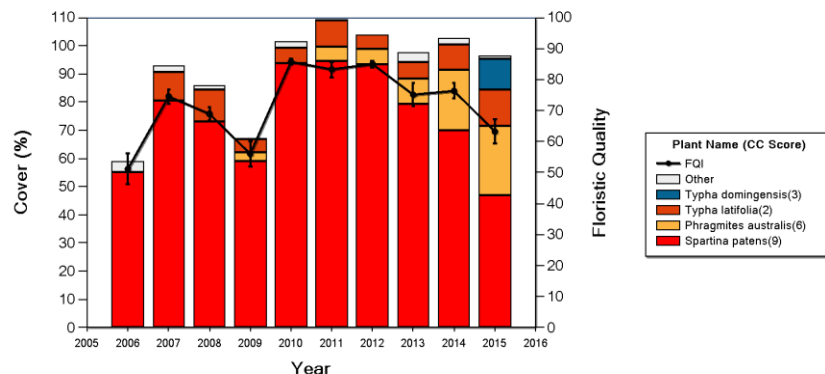
Floristic Quality Index for Saline Marsh, Site CRMS0655



Floristic Quality Index for Brackish Marsh, Site CRMS0672



Floristic Quality Index for Intermediate Marsh, Site CRMS0647



Ex: All *Spartina patens* are red as defined by user.



Coastwide Reference Monitoring System – Wetlands Site Navigation

a CWPRA funded project



Coastwide Reference Monitoring System

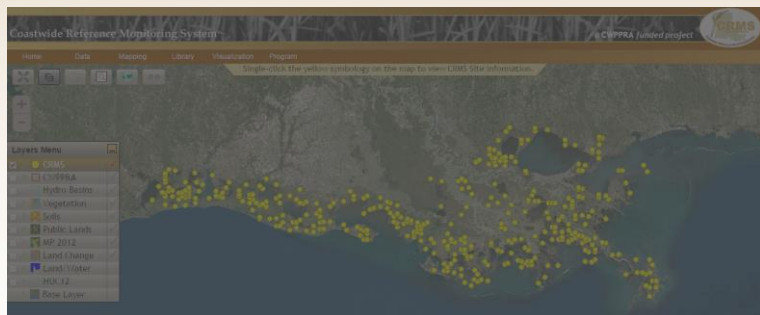
Home Data Mapping Library Visualization Program

**Map****Data****FAQ****Factsheet**

Wetland restoration efforts conducted in Louisiana require monitoring the effectiveness of individual projects as well as monitoring the cumulative effects of all projects in restoring, creating, enhancing, and protecting

➔ **Data**

Charting



Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

Previous Charting Version

Charting Bulk Charting **Data Download** Reporting

Data Download

Data available through this website are calculated or derived values based on the original data which are available from the CIMS database ([CIMS](#))

- Hydro
- Vegetation
- Soil
- Spatial

Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

Previous Charting Version

Charting Bulk Charting Data Download Reporting

- Hydro
- Vegetation
- Soil
- Spatial
- Report Card Charts

Clear Charts



Coastwide Reference Monitoring System – Wetlands Bulk Data Download

Coastwide Reference Monitoring System

a CWPRA funded project



Home Data Mapping Library Visualization Program

All charts showing elevation data are draft while system updates are occurring.

Charting

Bulk Charting

Data Download

Reporting

Data Download

Data available through this website are calculated or derived values based on the original data which are available from the CIMS database ([CIMS](#))

▶ Hydro

▶ Vegetation

▶ Soil

▶ Spatial



Coastal Protection and
Restoration Authority

[Log In]

Home Data Download Library Viewer Outreach Help

Monitoring Data

Hydrographic Data

Hydrographic data are now available in two general formats: data collected monthly and data collected hourly. Parameters sampled generally include: water level, water temperature, specific conductance, and salinity. In some rare instances water velocity and wind speed/wind direction are sampled at stations where hourly data are collected.

Hydrographic Monthly Data

[Retrieve Monthly Data](#)

Monthly hydrographic data can be downloaded either by project, CRMS (Coastwide Reference Monitoring System) site, or station number. These files are relatively small, as there are only approximately 12 records per station per year. In general, there is a much larger spatial distribution of stations where monthly data are collected than where hourly data are collected. Note: for CRMS stations, these monthly data comprise Soil Porewater data.

Hydrographic Hourly Data

[Retrieve Hourly Data](#)

Hourly hydrographic data may also be downloaded either by project, CRMS (Coastwide Reference Monitoring System) site, or station number; however these files are much larger than the monthly files. For example, since one year of hourly sampling will yield approximately 8,760 records, a file for a project collecting data at 3 stations for a period of 5 years will contain approximately 131,400 records. Many typical spreadsheet programs will not be able to completely open a file of this size. For this reason, we recommend that hourly data be downloaded by station and not by project. Data are not necessarily available for download from all stations. However, if you would like to request data that are not currently available from the database, an alternate request option is available (see Other Data, below).

Accretion Data

[Retrieve Accretion Data](#)

Accretion data can be downloaded either by project, CRMS (Coastwide Reference Monitoring System) site, or station number. These data are collected from specific locations within herbaceous marsh vegetation areas and forested swamp/bottomland hardwood vegetation areas, and are collected at 6 months and 12 months after monitoring station establishment. Accretion measurements show rates of soil accretion or soil erosion at a location.

Forested Swamp Vegetation Data

[Retrieve Forested Swamp Vegetation Data](#)

Forested Swamp Vegetation data can be downloaded either by project, CRMS (Coastwide Reference Monitoring System) site, or station number. These data are collected from specific areas that represent vegetative communities, and are collected at various time intervals. Individual stations consist of 20m x 20m plots, and parameters sampled include: vegetation species present, densiometer readings, percent canopy cover, and tree trunk diameter.





Coastwide Reference Monitoring System – *Wetlands*

Bulk Data Download

• CRMS bulk data download

All values for selected years, for
selected stations

(queue processes first come first serve)

▼ Hydro

Hydro Averages
Hydro Index
Percent Flooded
Water Level Range
Shifted Water Elevation Data

▼ Vegetation

Basal Area
Floristic Quality Index
Marsh Class
Veg Percent Cover
Vegetation Volume Index

▼ Soil

Surface Elevation Change Rate
Submergence Vulnerability Index
Vertical Accretion Rates

▼ Spatial

Percent Land
1km Land/Water

Same interface for data selection as charting

Charting

Bulk Charting

Data Download

Reporting

Data Download

Data available through this website are calculated or derived values based on the original data which are available from the CIMS database ([CIMS](#))

Water Year is October 1 - September 30

Yearly ▼

Calendar Year ▼

Year:

	Select All	Deselect All
1992	▲	1994
1993		1995
1997		1996
1998		
1999		
2000		
2001		
2002		
2003	▼	
Submit		

Basin: All Basins ▼ Project: All Projects ▼

	Select All	Deselect All
BA04-17	▲	BA04-07
BA04-20		BA04-10
BA04-55		
BA04-56		
BA20-08		
BA20-11		
BA20-20		
BA20-90R		
BA20-91R	▼	

[Show Map Selector](#)

Email Address:

Submit Request



Coastwide Reference Monitoring System – Wetlands Site Navigation/Reporting

a CWPRA funded project



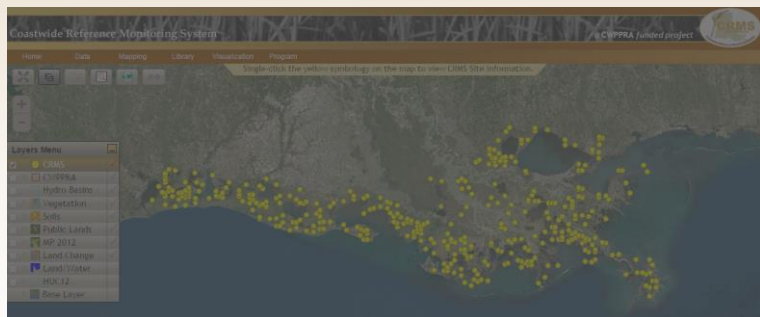
Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

**Map****Data****FAQ****Factsheet**

Wetland restoration efforts conducted in Louisiana require monitoring the effectiveness of individual projects as well as monitoring the cumulative effects of all projects in restoring, creating, enhancing, and protecting

➔ **Data/Reporting** Charting



Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

Previous Charting Version

Charting Bulk Charting Data Download **Reporting**

Data Download

Data available through this website are calculated or derived values based on the original data which are available from the CIMS database ([CIMS](#))

- Hydro
- Vegetation
- Soil
- Spatial

Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

Previous Charting Version

Charting Bulk Charting Data Download Reporting

- Hydro
- Vegetation
- Soil
- Spatial
- Report Card Charts

Clear Charts



Coastwide Reference Monitoring System – *Wetlands* Reporting

Charting

Bulk Charting

Data Download

Reporting

Generate Report Card

Year: 2011

Generate Report Card

Site Level Report

Project Level Report

Basin Level Report

Coastwide Level Report

OM&M

CRMS0002

CRMS0003

CRMS0006

CRMS0008

CRMS0030

CRMS0033

CRMS0034

CRMS0035

CRMS0038

CRMS0039

CRMS0046

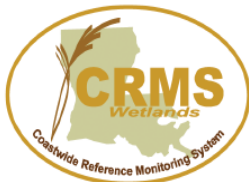
CRMS0047

Submit Request

[Report Card CRMS0003 2011](#)



Coastwide Reference Monitoring System – Wetlands Report Cards



Coastwide Reference Monitoring System (CRMS)

Site Level Report Card

Site: CRMS0003
Year: 2011



7/16/2012

About the program

In 1990, the U.S. Congress enacted the Coastal Wetlands Planning, Protection and Restoration Act (CWPRA) in response to the growing awareness of Louisiana's land loss crisis. The CWPRA was the first federal, statutorily mandated program with a stable source of federal funds dedicated exclusively to the short- and long-term restoration of the coastal wetlands of Louisiana. To date, the CWPRA program has constructed more than 78 restoration projects. These projects use a variety of methods to restore, protect, and create coastal wetland habitat including: diversions of freshwater and sediments to improve marsh vegetation; dredged material placement for marsh creation; shoreline protection; sediments and nutrient trapping; hydrologic restoration through outfall, marsh, and delta management; barrier island restoration; and vegetation planting projects.

Need for a Monitoring System

Louisiana's coastal protection and restoration efforts, implemented through numerous CWPRA projects, require monitoring and evaluation of project effectiveness and cumulative effects of all projects to achieve a sustainable coastal environment. In 2003, the CWPRA Task Force approved the implementation of a Coastwide Reference Monitoring System (CRMS) as a means to monitor and evaluate the effectiveness of CWPRA projects at three levels: project, region, and coastwide (Creefer et al., 2003). The CRMS network is currently funded through CWPRA and the state of Louisiana and provides data for a variety of user groups including resource managers, academics, landowners, and researchers.



CRMS Approach and Design

The CRMS approach includes a suite of sites (391) that encompasses a range of ecological conditions across the coast. The CRMS site locations were selected randomly throughout the coastal zone. Sites represent the entire range of ecological variability within a degraded coastal landscape. Sites are located within (project sites) and outside (reference sites) of coastal restoration projects. Trajectories of changing conditions in reference sites are compared with trajectories of change within project sites through time. The CRMS design not only allows for monitoring and evaluating the effectiveness of each project but will also support ongoing evaluation of the cumulative effects of all CWPRA projects throughout the coastal ecosystem of Louisiana. More information about the CRMS project is provided within a USGS factsheet (<http://pubs.usgs.gov/fi/2010/3018/>).

About the Interactive Report Card

Through the Coastal Wetlands Planning, Protection, and Restoration Act (CWPRA) a comprehensive, standardized monitoring and assessment program has been developed to evaluate coastal restoration projects throughout the Louisiana coastal zone. The Coastwide Reference Monitoring System (CRMS) collects monitoring data for numerous ecological variables. Using CRMS data, indices have been developed to assess wetland hydrology, vegetation, and soils. This interactive report card provides summary information and displays index scores for individual CRMS sites, restoration projects, hydrologic basins, and the entire Louisiana coast.

Index Development

What is an Index?

An index combines and synthesizes scientific data to help inform or assess a topic of interest. Each index helps explain the condition of a particular aspect of the coastal wetland ecosystem. By comparing indices at various time and spatial scales we can understand the overall condition of coastal wetlands in Louisiana.

How were the indices developed?

CRMS Analytical Teams, made up of agency and academic personnel, developed indices based on the suite of parameters available from the 2006 to 2009 CRMS dataset. Three indices have been developed: a floristic quality (FQI), hydrologic (HI), and submergence vulnerability (SVI), and a landscape index is currently being refined. Wetland vegetation, hydrology, and soils are undeniably interconnected and form the basis for ecological processes that ultimately influence future land change and the sustainability of coastal habitats. Although these indices have been developed using 4 years of baseline CRMS data, the indices will be refined to better define ecological relationships as the data set becomes more robust overtime.

Because no regulatory thresholds exist for the ecological parameters of interest, it was not possible to assess index scores based on previously defined values that would indicate an acceptable or unacceptable score. Therefore, for the FQI and the HI, assessments were made relative to a baseline distribution of the index scores derived from 2006 to 2009 data at CRMS sites across the Louisiana coast. Because ideal thresholds were not available for the FQI and HI, scores were classified as 'good' (green) if they exceeded the 75th percentile of index scores calculated for all CRMS sites during the baseline period, 'poor' (red) if they did not exceed the 25th percentile, or 'fair' (yellow) if they were intermediate to the 25th and 75th percentiles (Figure 1).

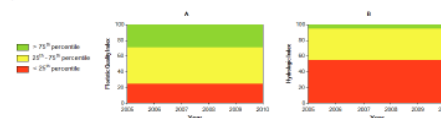
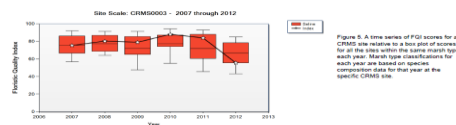
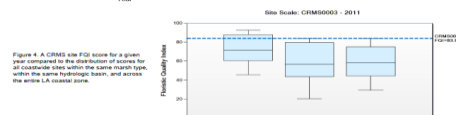
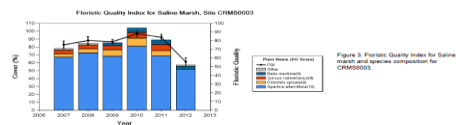


Figure 1. Example of how classifications change based on the assessment index and index score distribution. A) Floristic Quality Index distribution and B) Hydrologic Index distribution based on coastwide data from 2006 to 2009.

Site Scale Assessment: CRMS0003 Floristic Quality Index (FQI)

The following graphics provide information about the CRMS site of interest with regard to the floristic quality index. These graphics provide an assessment of the vegetation quality of this site relative to other sites within a similar marsh type, basin, and coastwide.



Coastwide Scale Assessment: Floristic Quality Index (FQI)

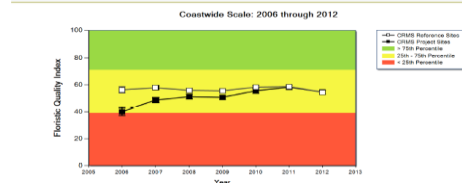


Figure 17. FQI scores across the coast are shown over time. The mean (± SE) FQI scores are calculated for all project and reference sites by year. CRMS Project Sites: 2006 N = 74, 2007 N = 133, 2008 N = 142, 2009 N = 144, 2010 N = 196, 2011 N = 143, 2012 N = 143. CRMS Reference Sites: 2006 N = 122, 2007 N = 237, 2008 N = 245, 2009 N = 243, 2010 N = 238, 2011 N = 244, 2012 N = 243.

Coastwide Scale Assessment: Hydrologic Index (HI)

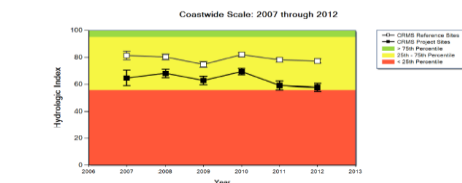


Figure 18. HI scores across the coast are shown over time. The mean (± SE) HI scores are calculated for all project and reference sites by year. CRMS Project Sites: 2007 N = 26, 2008 N = 72, 2009 N = 92, 2010 N = 111, 2011 N = 121, 2012 N = 127. CRMS Reference Sites: 2007 N = 60, 2008 N = 131, 2009 N = 171, 2010 N = 200, 2011 N = 209, 2012 N = 212.

- Dynamic documents
- Program and Index explanations
- Multi-scale assessments site, project, basin, coastwide



Coastwide Reference Monitoring System – Wetlands Site Navigation/Mapping Viewer

a CWPRA funded project



Coastwide Reference Monitoring System

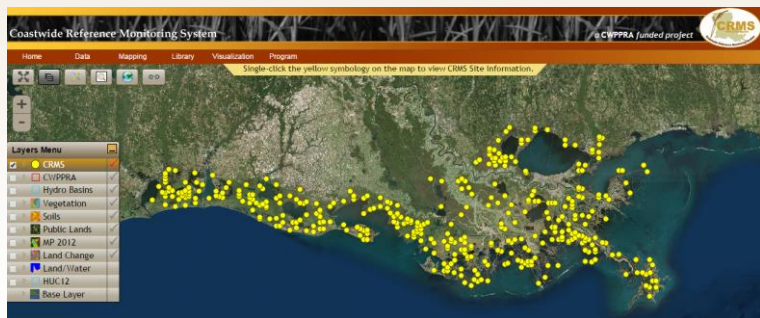
Home Data Mapping Library Visualization Program

Map Data FAQ Factsheet

Wetland restoration efforts conducted in Louisiana require monitoring the effectiveness of individual projects as well as monitoring the cumulative effects of all projects in restoring, creating, enhancing, and protecting



Map



Data

Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

Previous Charting Version

Charting Bulk Charting Data Download Reporting

Data Download

Data available through this website are calculated or derived values based on the original data which are available from the CIMS database ([CIMS](#))

- Hydro
- Vegetation
- Soil
- Spatial

Charting

Coastwide Reference Monitoring System

Home Data Mapping Library Visualization Program

Previous Charting Version

Charting Bulk Charting Data Download Reporting

- Hydro
- Vegetation
- Soil
- Spatial
- Report Card Charts

Clear Charts



Coastwide Reference Monitoring System – *Wetlands* Mapping Viewer

Coastwide Reference Monitoring System

a CWPPRA funded project



Home Data Mapping Library Visualization Program



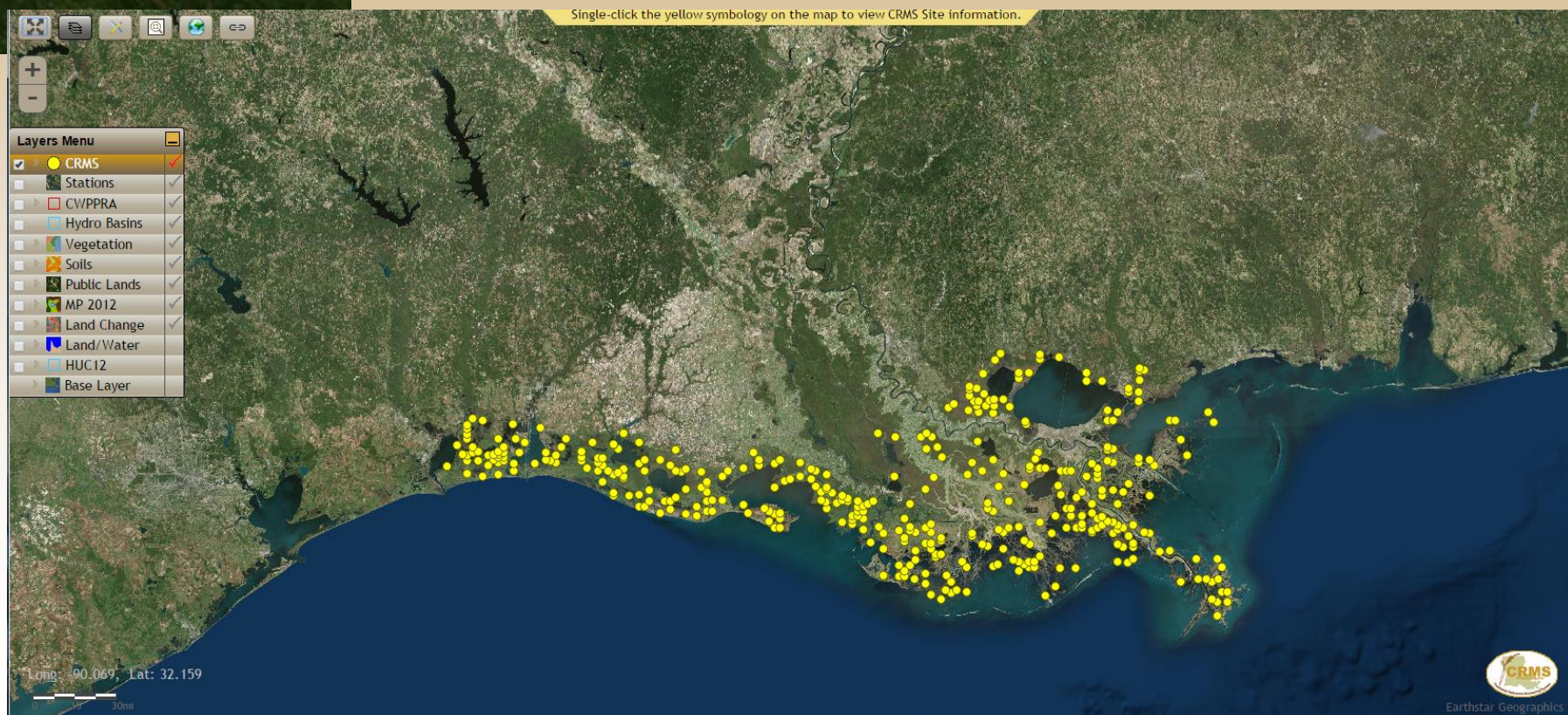
Single-click the yellow symbology on the map to view CRMS Site information.

- Layers Menu**
- ☒ CRMS
 - ☐ Stations
 - ☐ CWPPRA
 - ☐ Hydro Basins
 - ☐ Vegetation
 - ☐ Soils
 - ☐ Public Lands
 - ☐ MP 2012
 - ☐ Land Change
 - ☐ Land/Water
 - ☐ HUC12
 - ☐ Base Layer

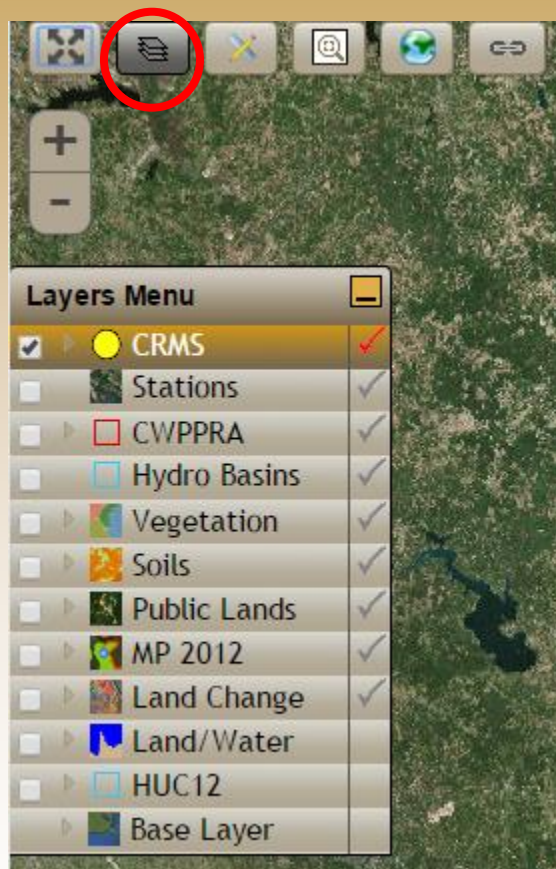


Earthstar Geographics

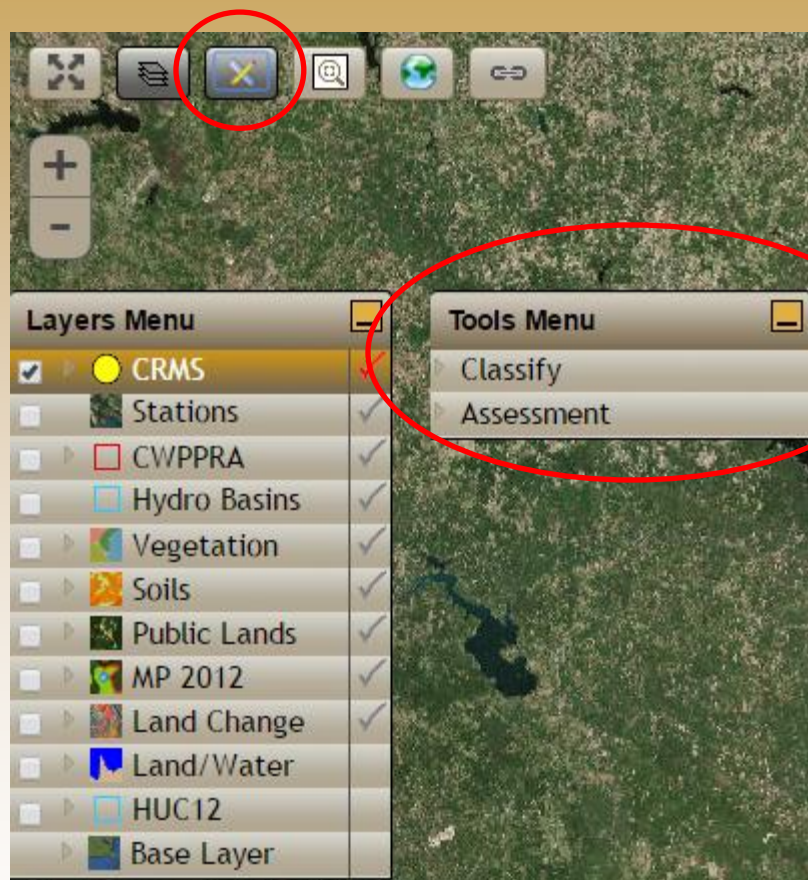
Hides the CRMS Website banner and menu.
Allows for more map viewing space.



Shows and hides the Layers Menu

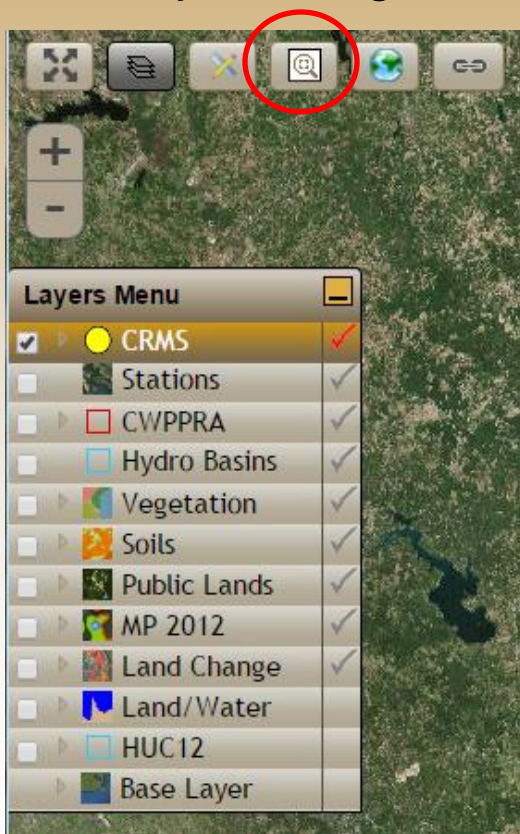


Activate Tools Menu

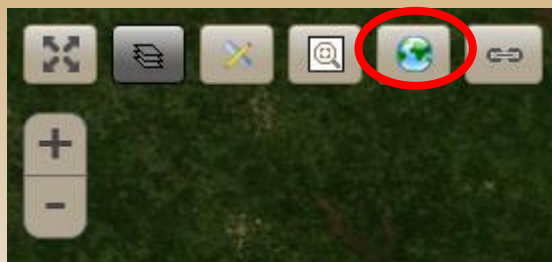


Zoom:

By rectangle



To Full Extent

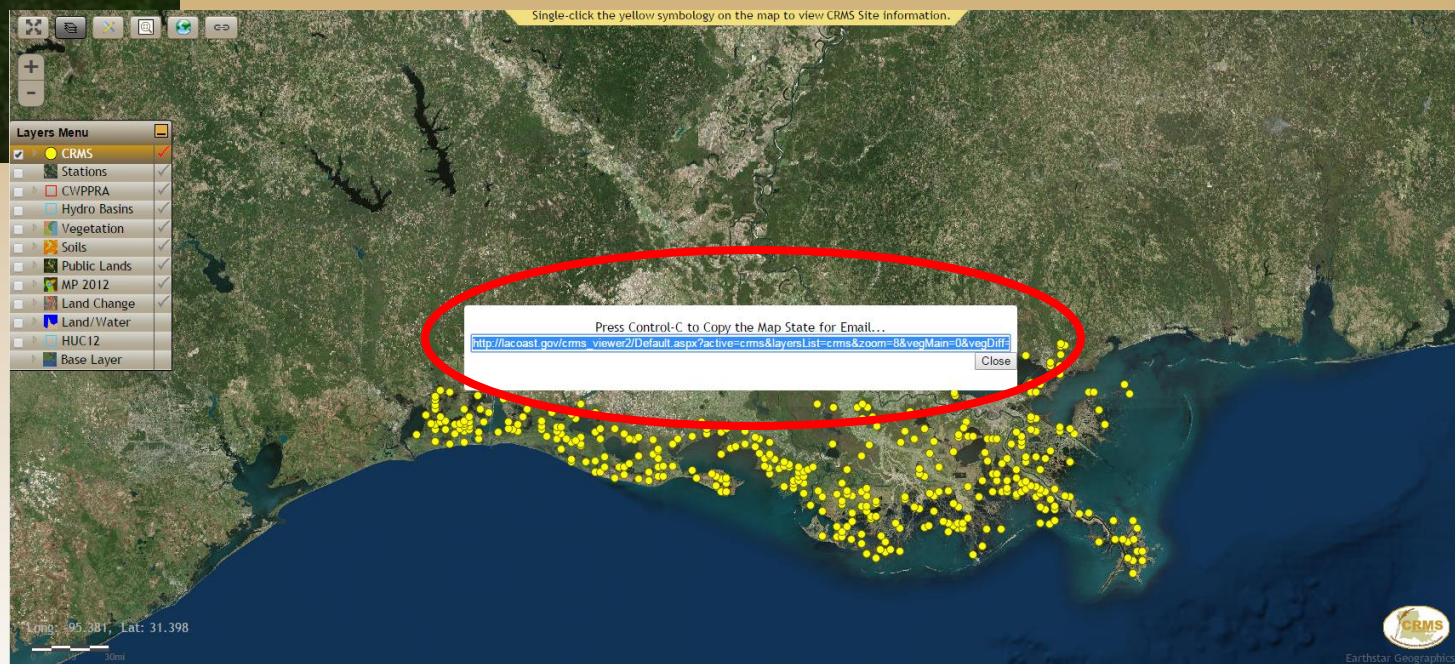


In & out



Used to create a save state on the map.

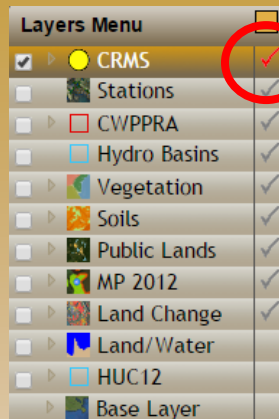
Link created to save the current state of the map.



Great to email to someone so that you know you are looking at the same information at different computers.



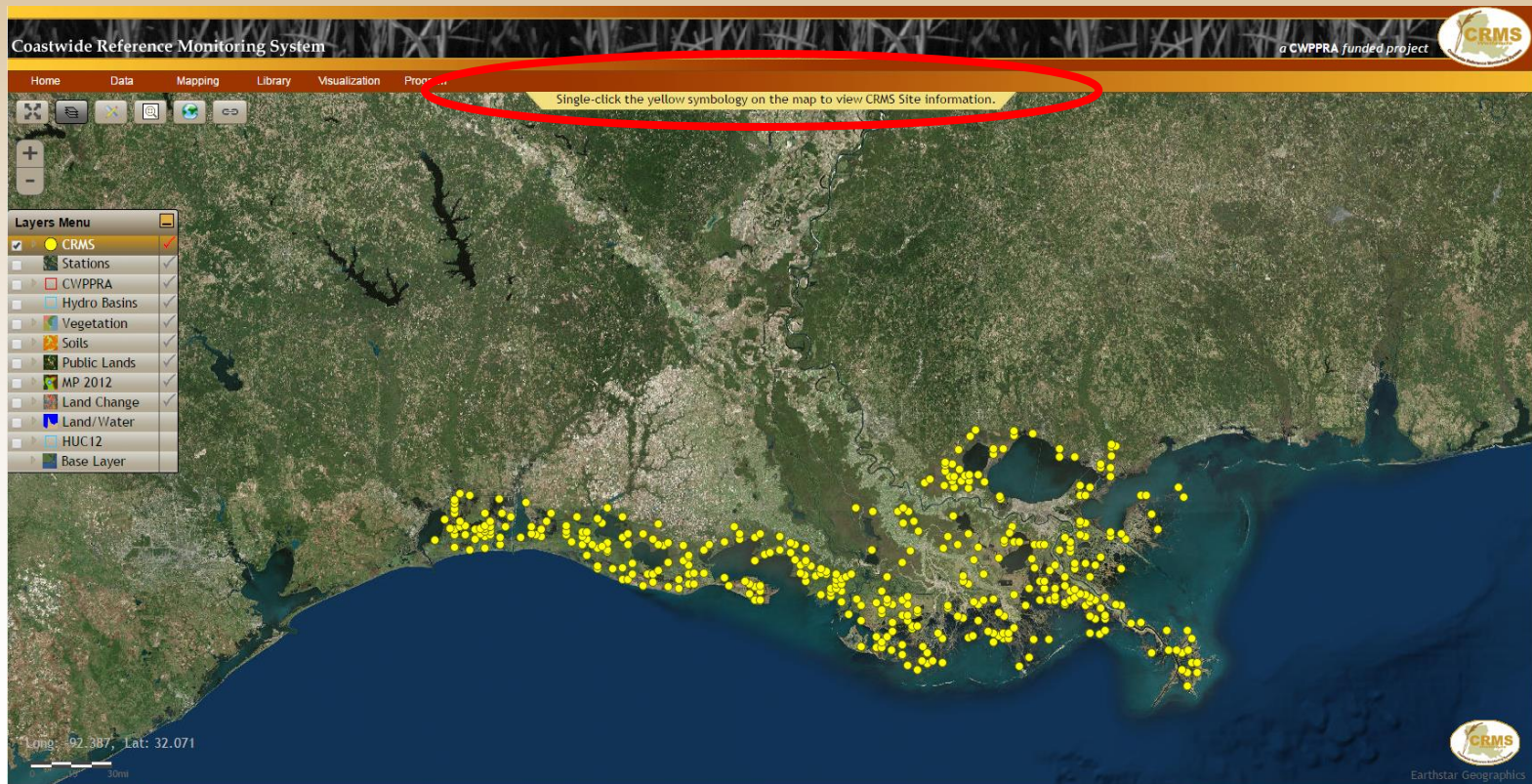
Coastwide Reference Monitoring System – Wetlands Activating Layers



You must activate the layer to interact with it on the map!!!!

Manila dropdown shows how to interact with the current active layer.

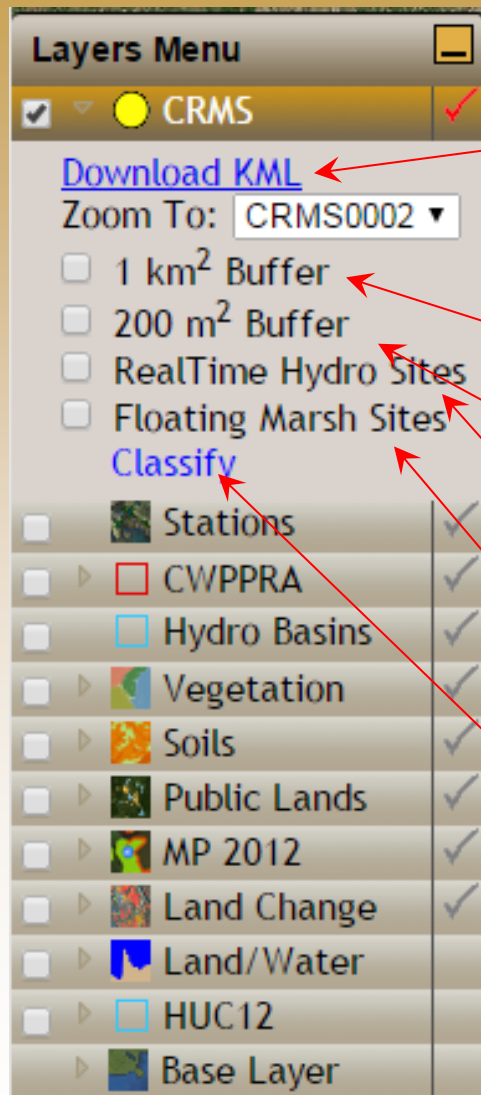
Single-click the yellow symbology on the map to view CRMS Site information.





Coastwide Reference Monitoring System – *Wetlands*

CRMS Active Layer Features



Download a KML file to used in Google Earth.

Zooms to the site and shows the site information bubble.

Adds/removes the 1 km² buffer layer
Aerial Photography Boundary

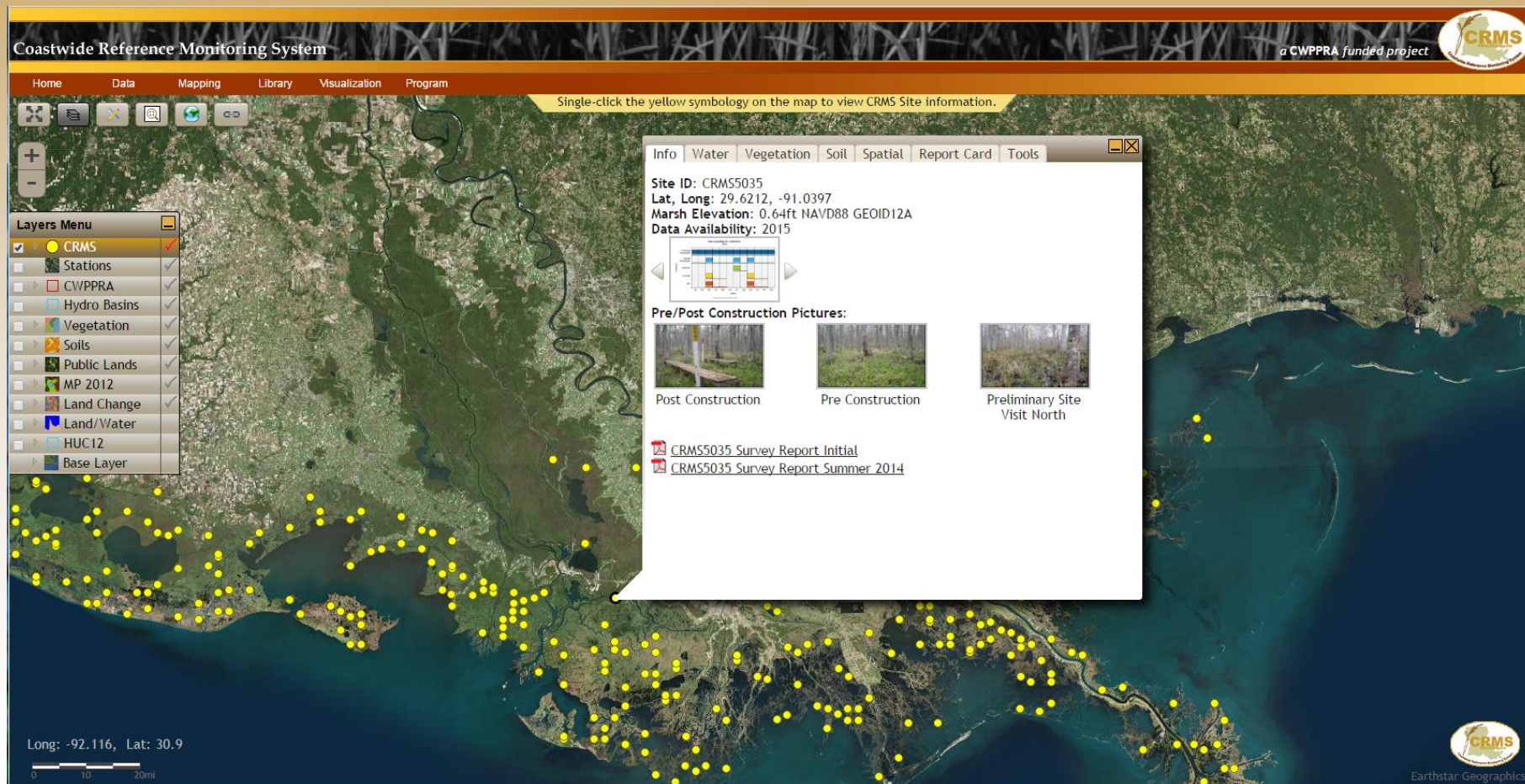
Adds/removes the 200 m² buffer layer
Ecological Data Collection Area

Highlights realtime hydro sites in blue

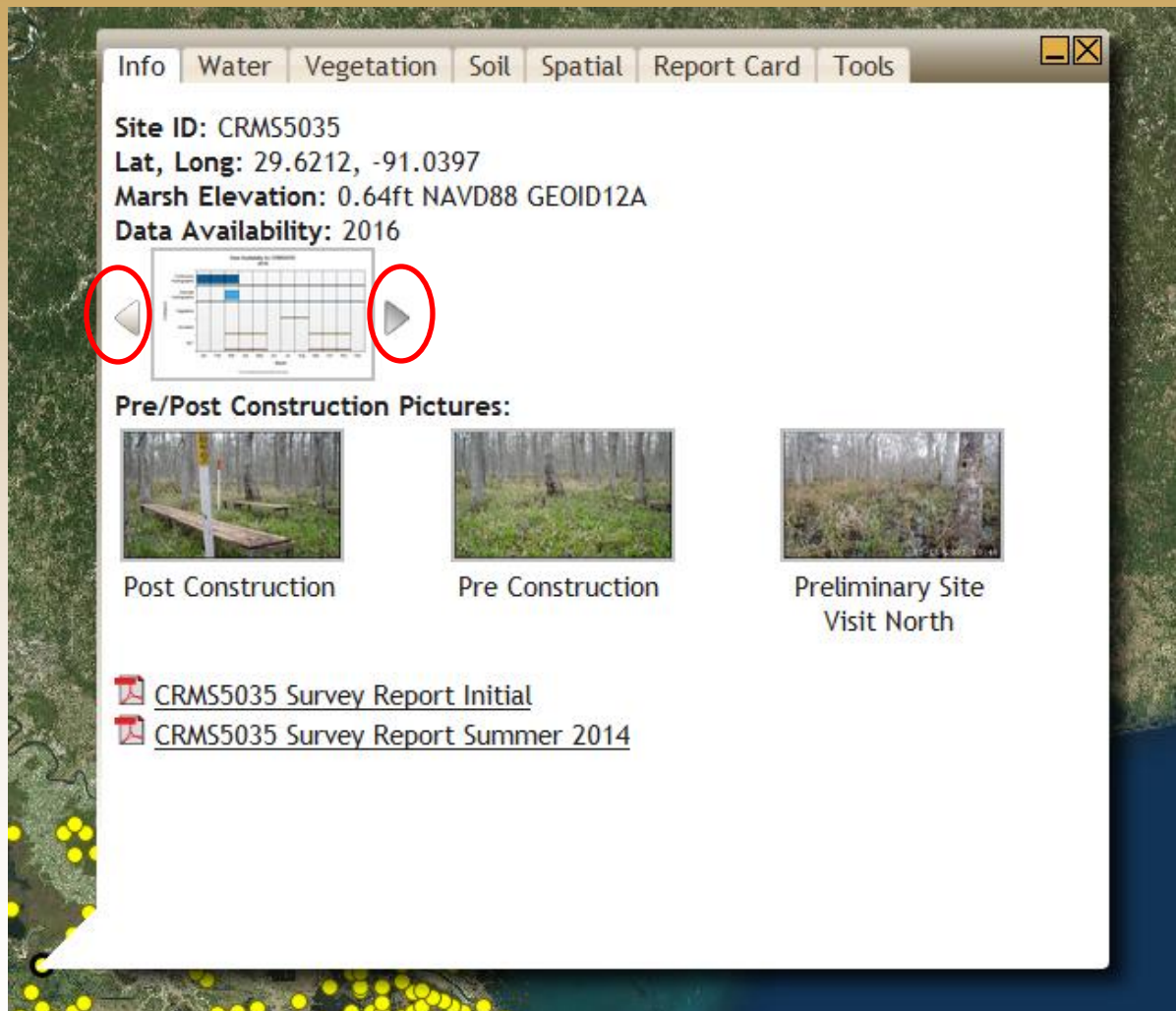
Highlights floating marsh sites in red

Classify invokes the tools menu with the classification option selected.

Click a point for site level information bubble



Site Information Bubble



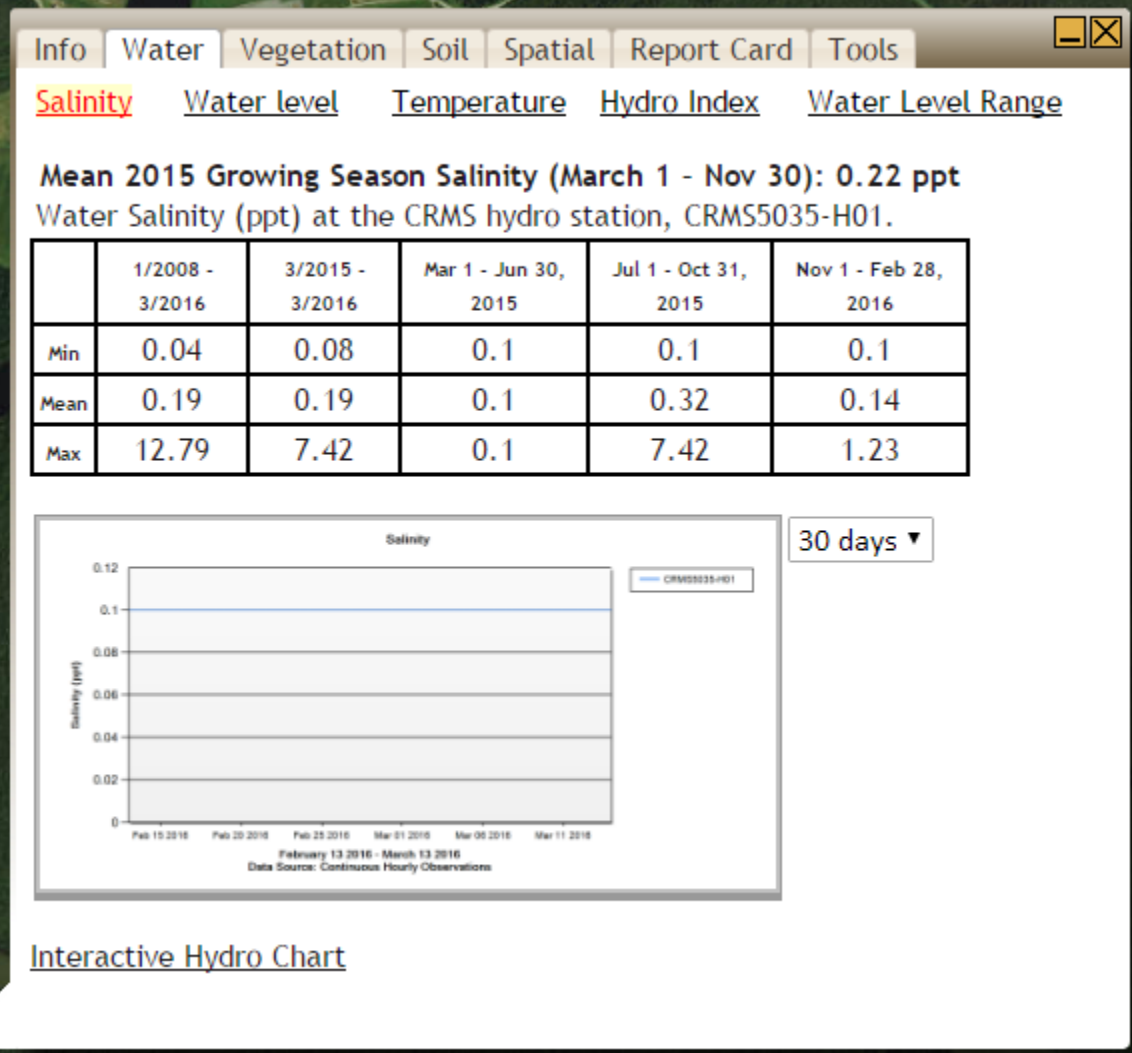
General information about the CRMS site including data availability, site photos, and survey reports.

Arrows allow user to scroll through data availability by year.

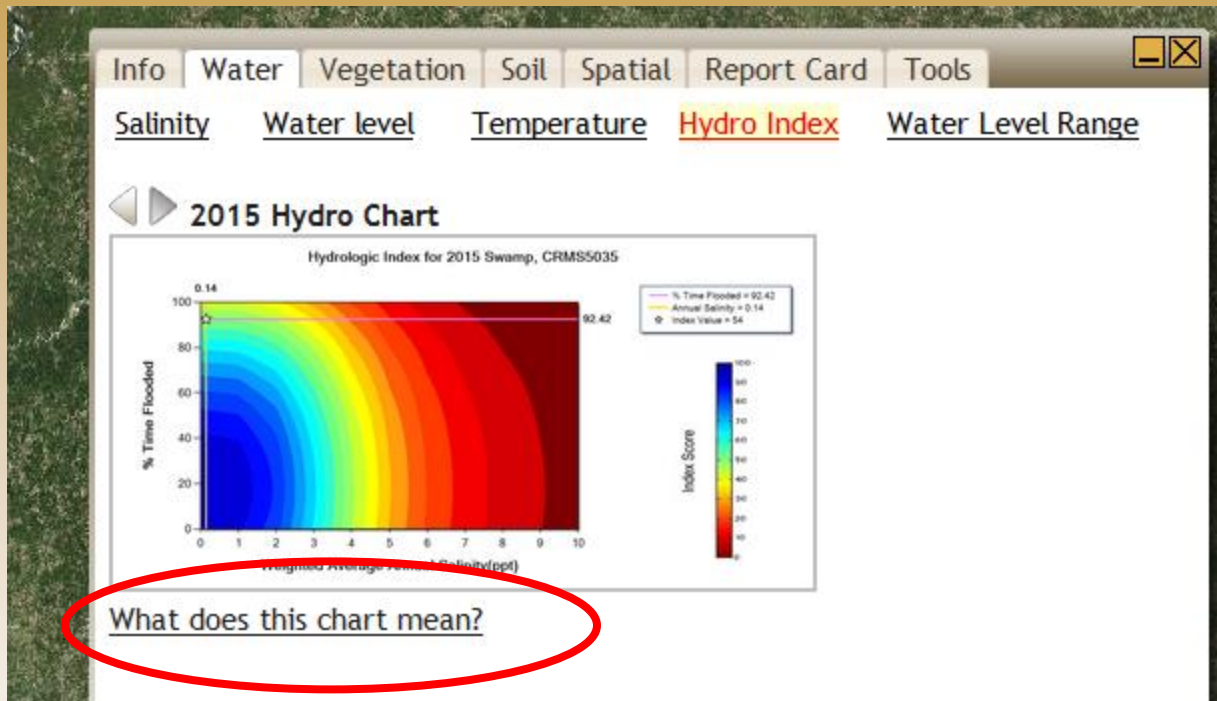
Site Information Bubble

The Water tab contains all hydrologic information for the selected site.

Salinity – Brief overview of salinity data for the site. Also charts most recent salinity data for the site.



Site Information Bubble



The Water tab contains all hydrologic information for the selected site.

Hydro Index – All Hydro Index charts available for the site.

CRMS

MOVE CLOSE

The Hydrologic Index (HI) jointly assesses the suitability of two critical aspects of wetland hydrology, average salinity and percent time flooded, in maximizing vegetation primary productivity for the 5 different marsh classifications in coastal Louisiana (swamp, fresh, intermediate, brackish, and saline). The index score ranges from 0 - 100, and the score corresponds to the percent of maximum vegetation productivity expected to occur if the separate effects of salinity and inundation on productivity interact in a multiplicative fashion, according to the following formula:

$$HI = fld \times sal$$

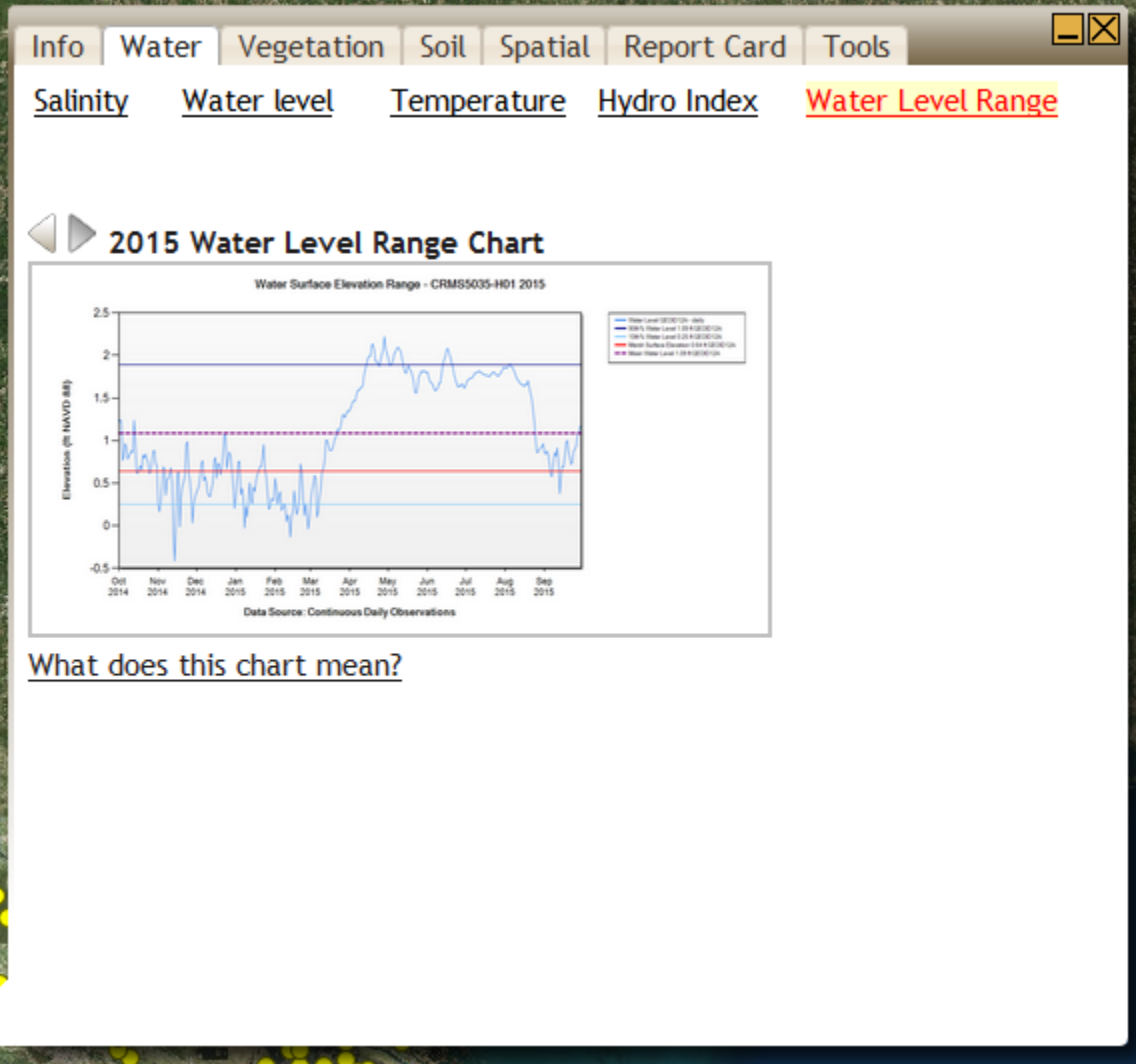
where fld is the percent maximum productivity attributable to percent time flooded, and sal is the percent maximum productivity attributable to the average annual salinity. Relationships describing how percent maximum productivity varies with salinity and percent time flooded were taken from the Habitat Switching Module of the LCA ecosystem restoration study (U.S. Army Corps of Engineers 2004).

The HI is calculated for a given water year, which begins October 1 and ends the following September 30.

Site Information Bubble

The Water tab contains all hydrologic information for the selected site.

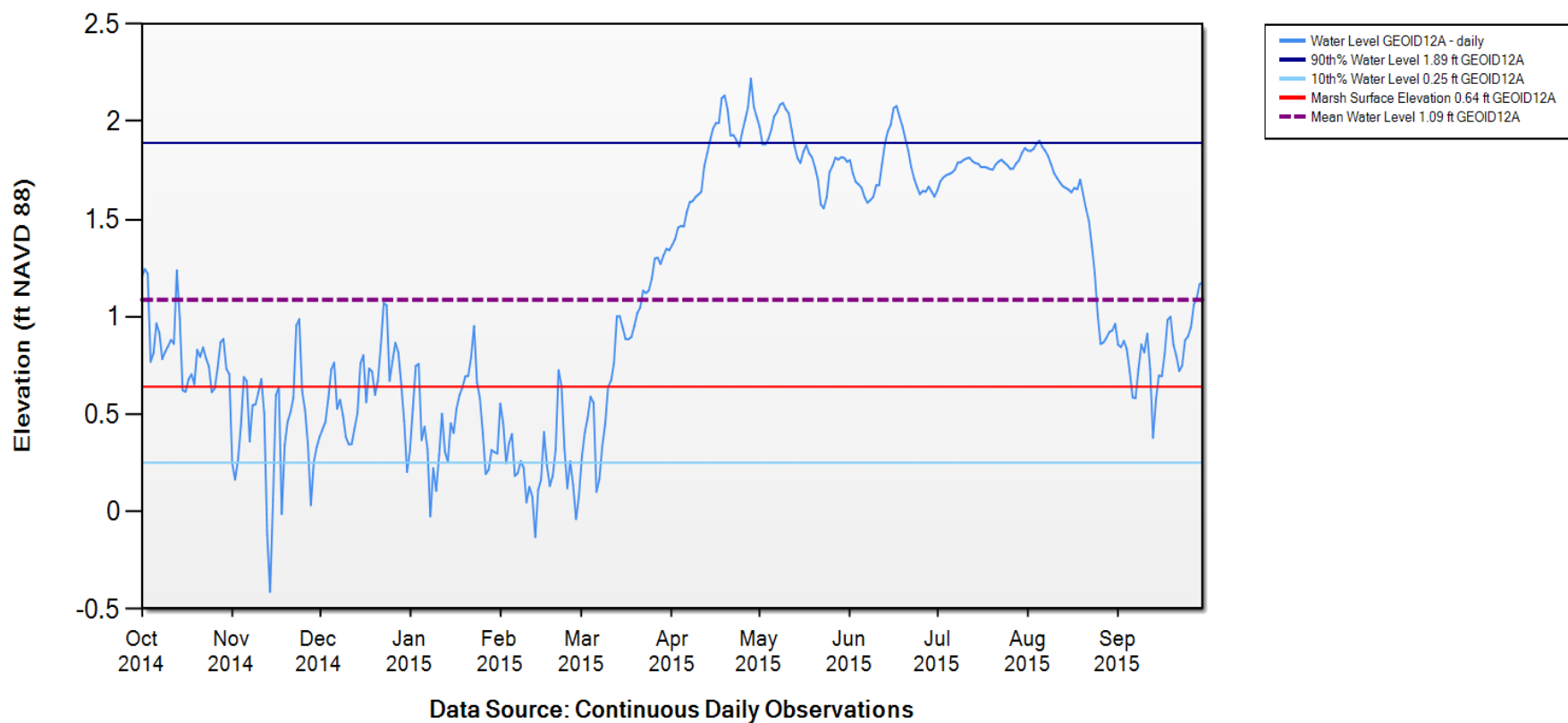
Water Level Range – All water level range charts available for the current site.



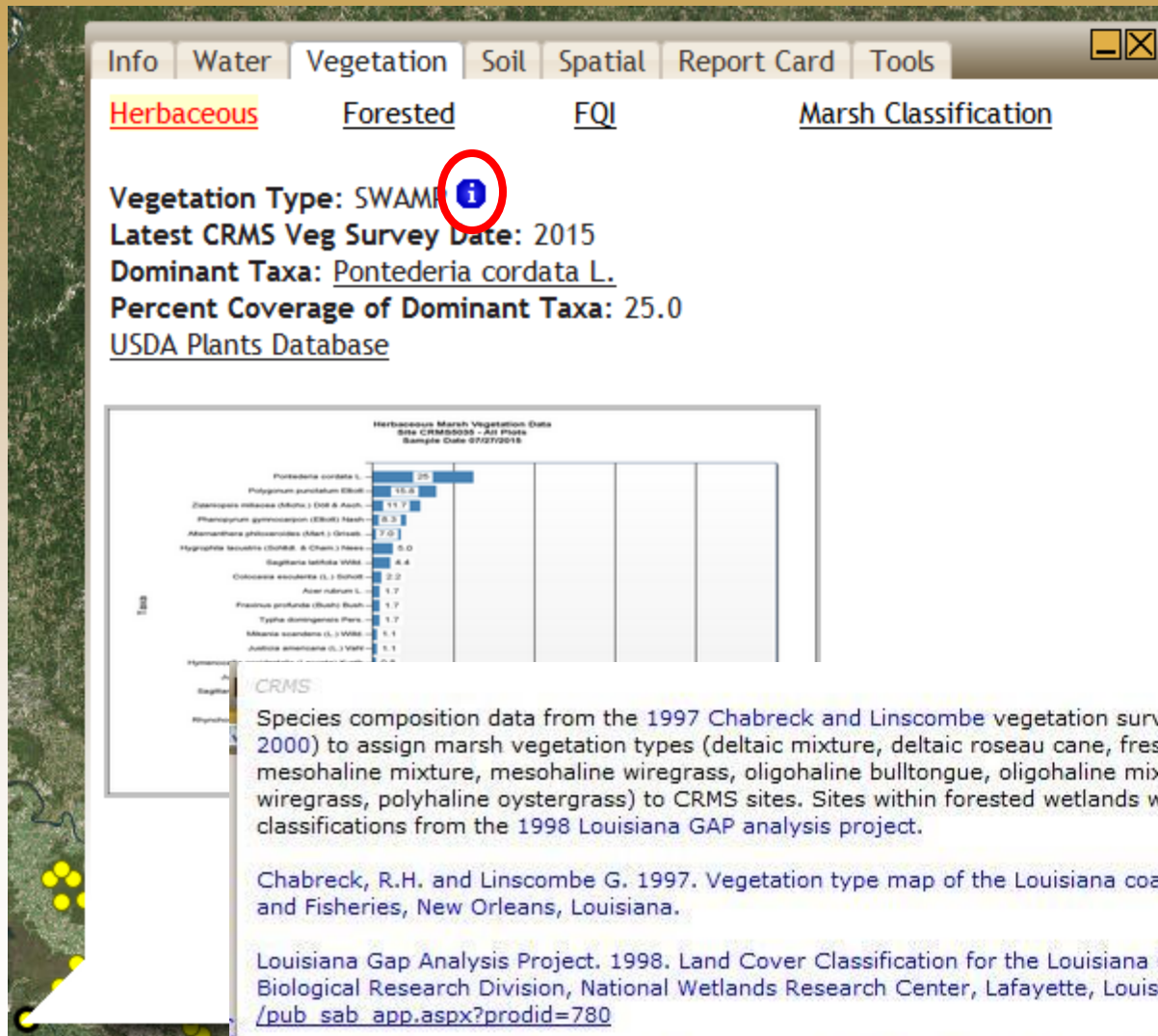


Site Information Bubble

Water Surface Elevation Range - CRMS5035-H01 2015



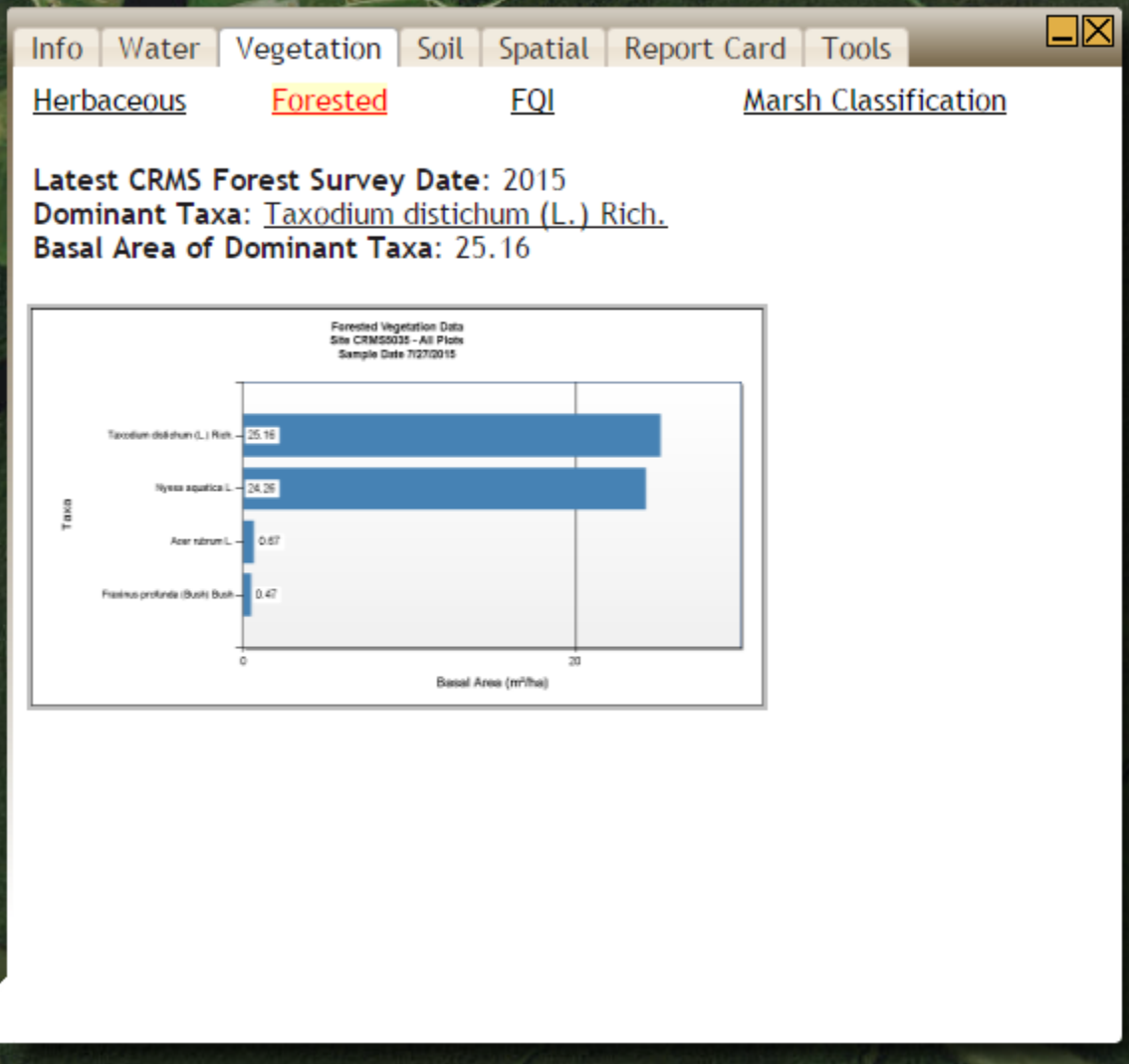
Site Information Bubble



The Vegetation tab contains all vegetation information for the selected site.

Herbaceous – Species driven percent cover chart.

Site Information Bubble



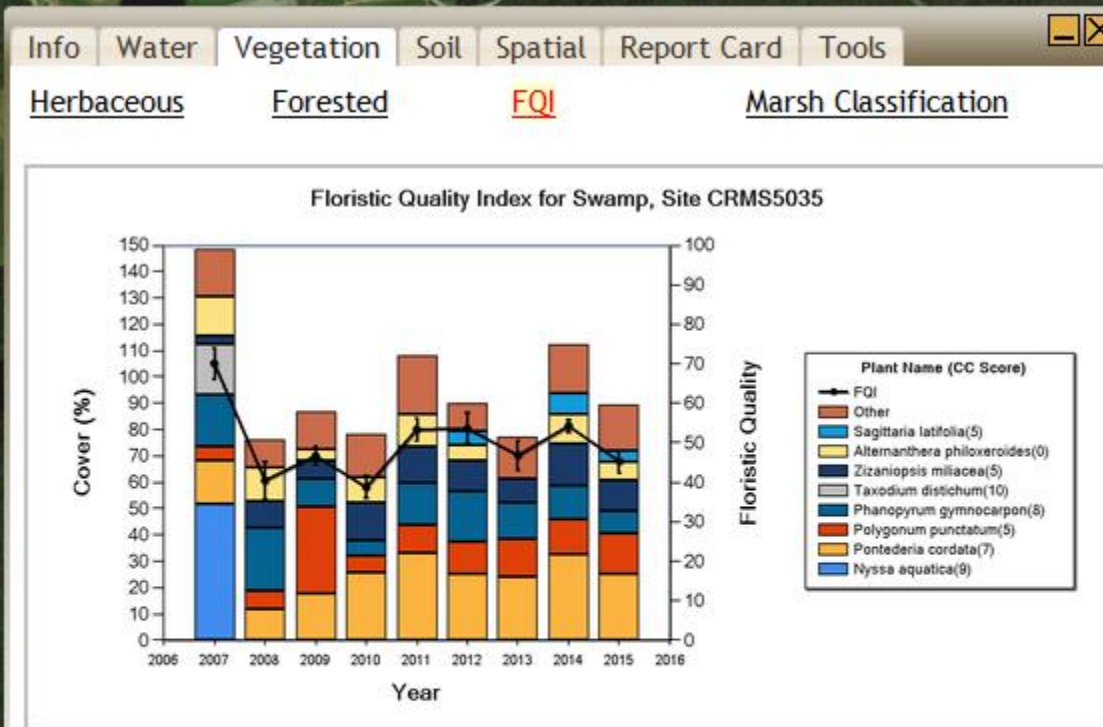
The Vegetation tab contains all vegetation information for the selected site.

Forested – Species driven basal area chart.

Site Information Bubble

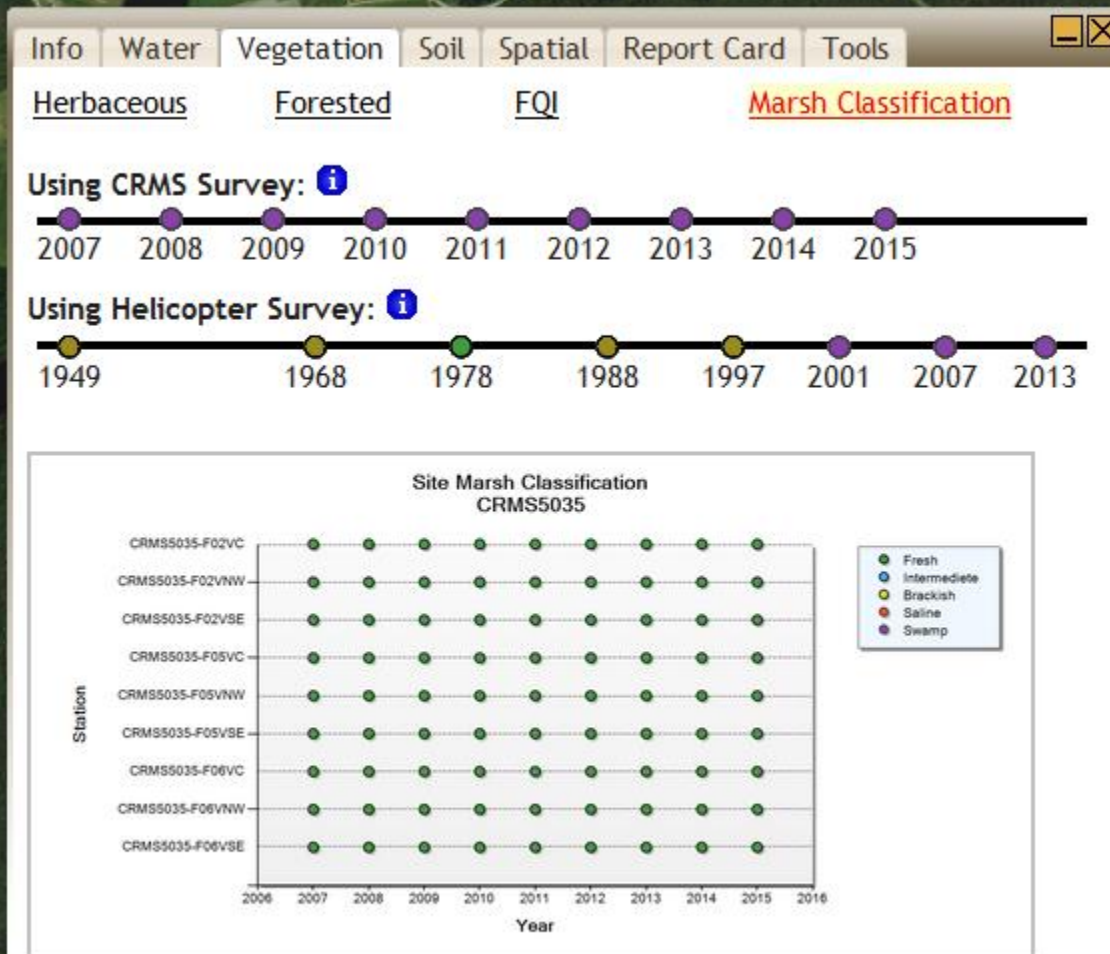
The Vegetation tab contains all vegetation information for the selected site.

Floristic Quality Index (FQI) chart showing vegetative species composition and FQI score annually.



What does this chart mean?

Site Information Bubble



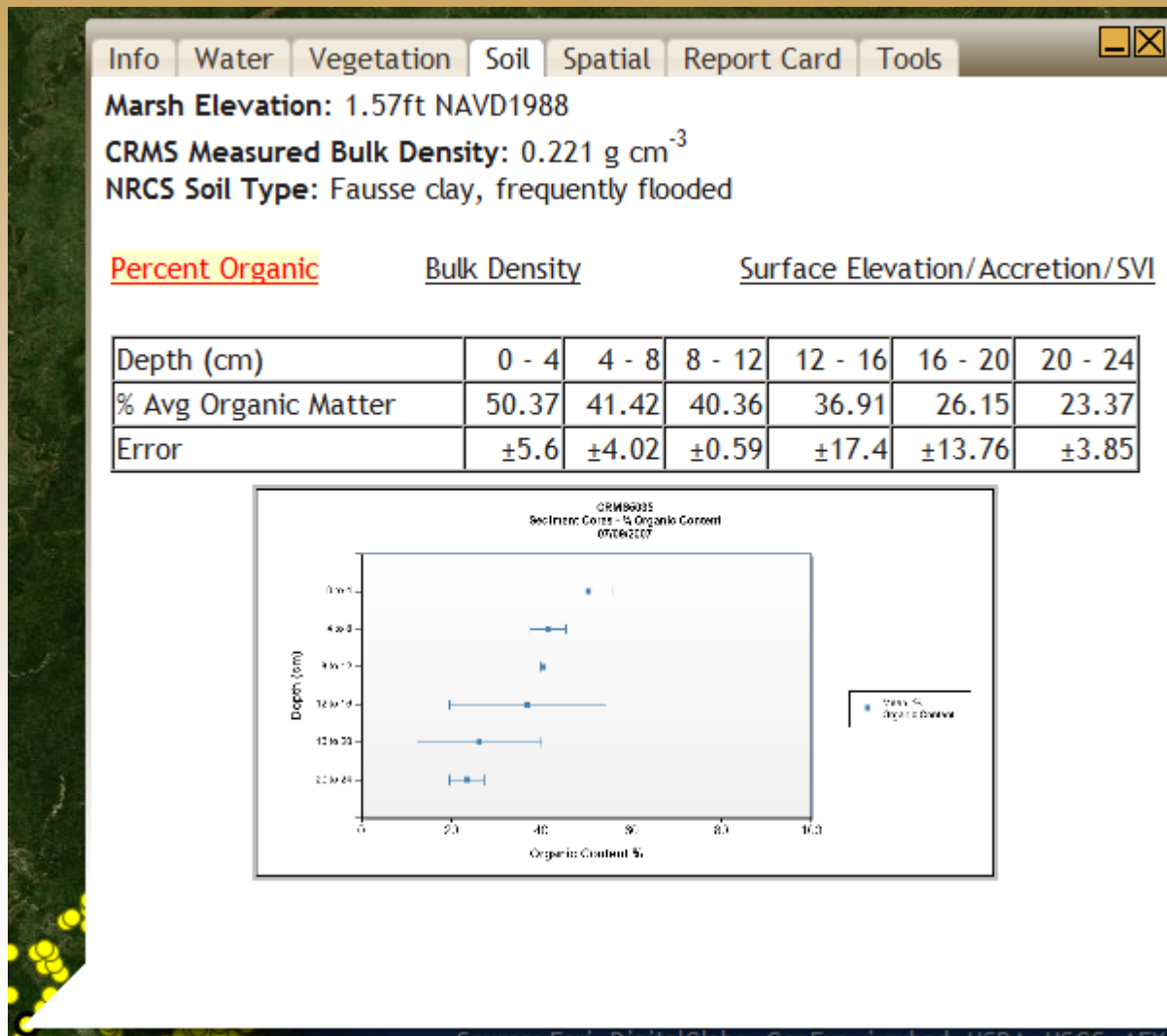
The Vegetation tab contains all vegetation information for the selected site.

Marsh Classification –
The chart displays marsh class by site over time.

Top bar is marsh class at the site level using annual on-the-ground vegetation survey data.

Bottom bar is marsh class at the site level using the helicopter survey data.

Site Information Bubble

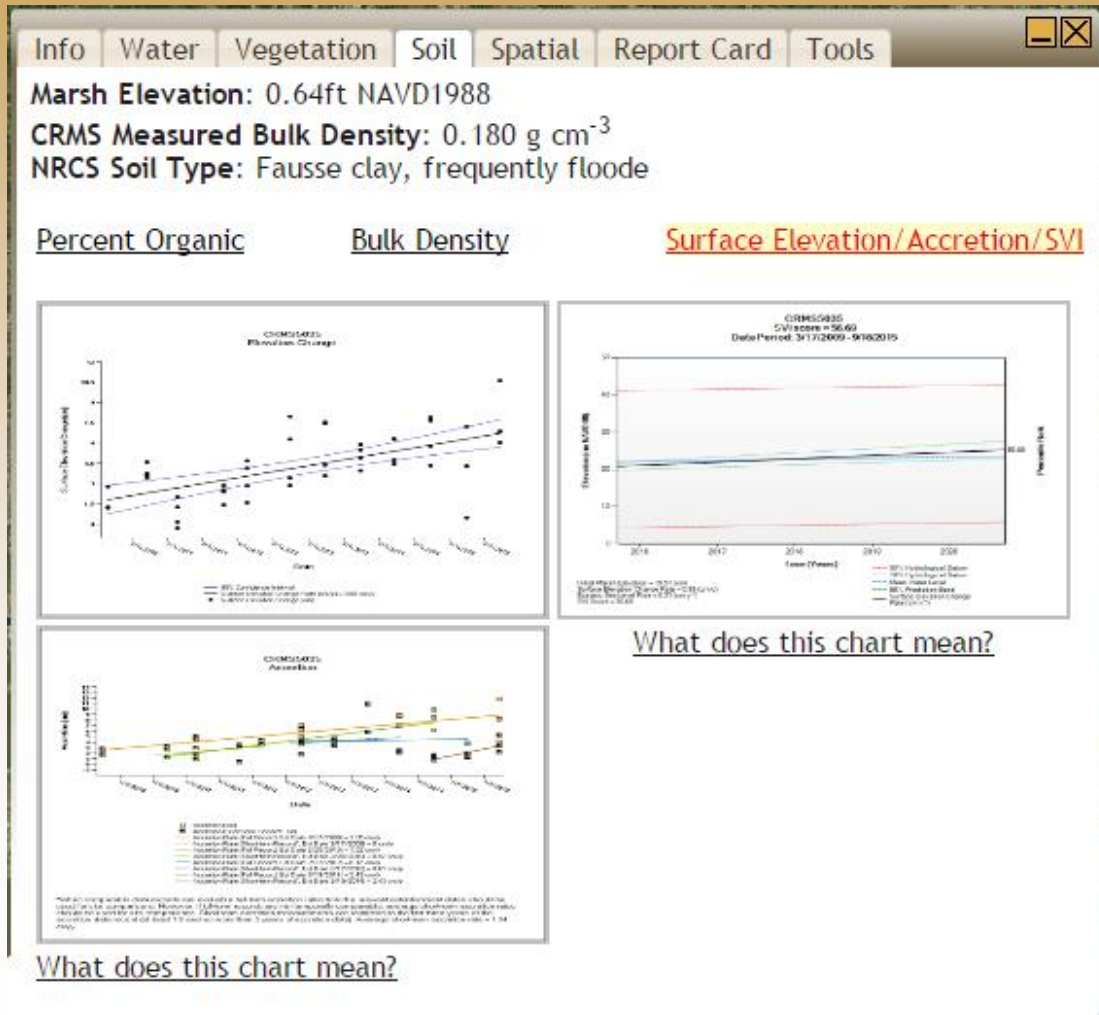


The Soil tab contains all soil information for the selected site.

Percent Organic – Soil profiles taken at site establishment.



Site Information Bubble

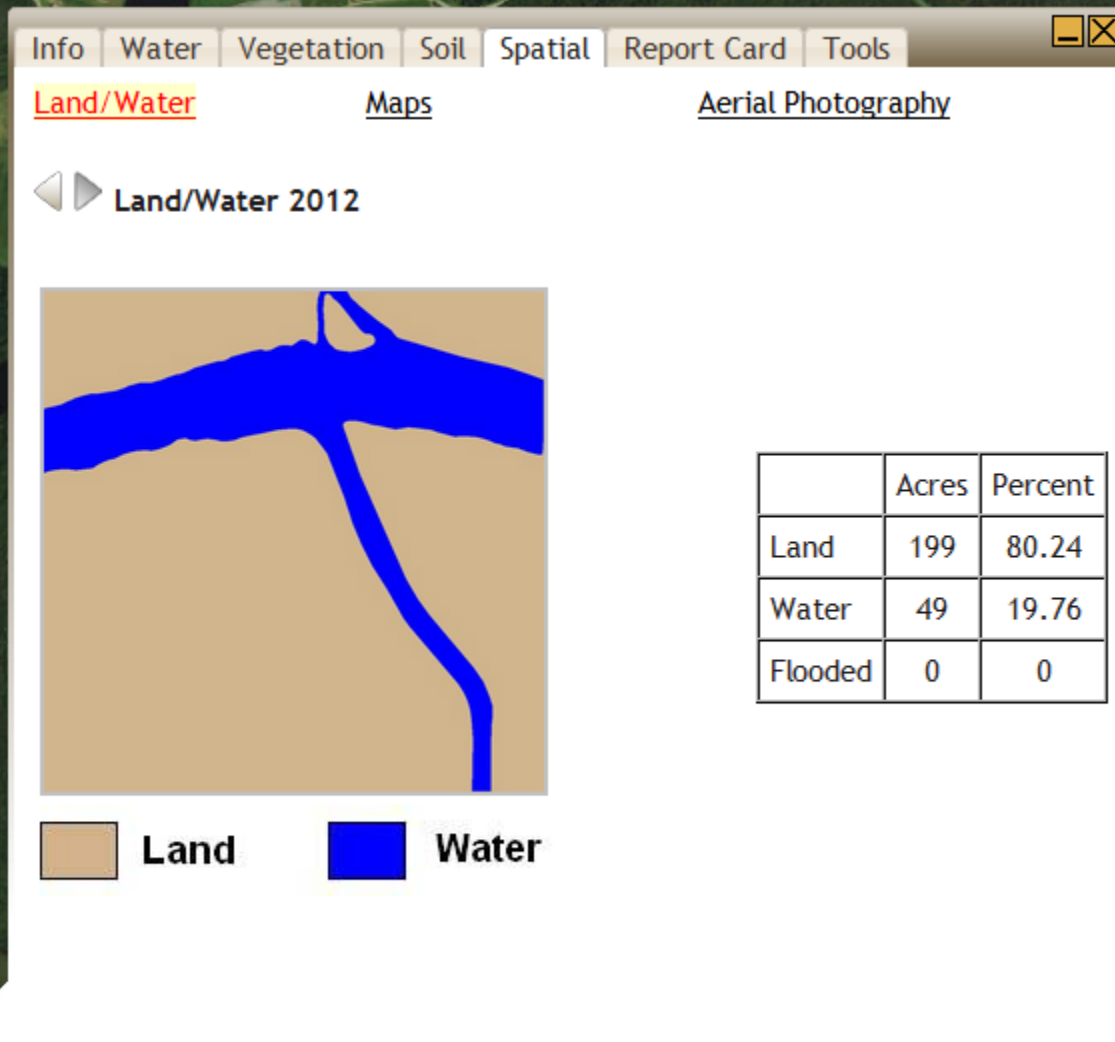


The Soil tab contains all soil information for the selected site.

Surface
Elevation/Accretion –
currently displays site
level elevation change and
accretion and gives rates
for shallow subsidence.



Site Information Bubble



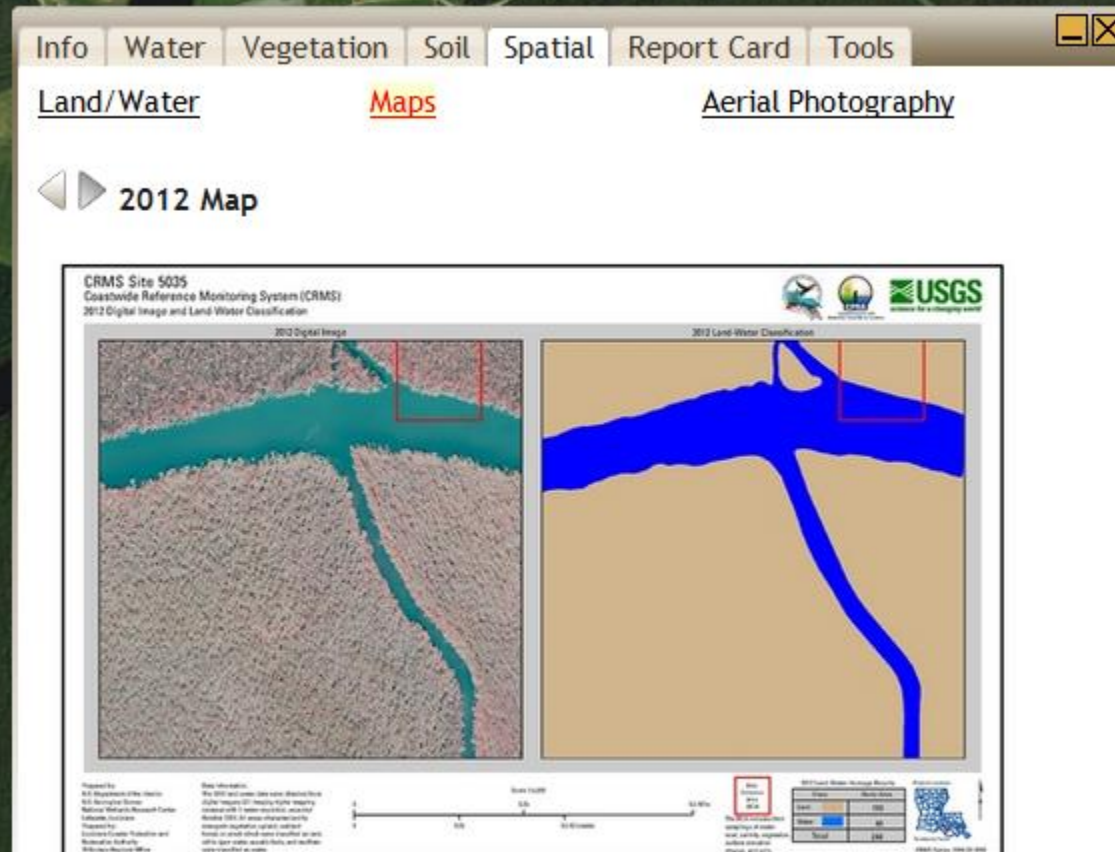
The Spatial tab contains all spatial information for the selected site.

Land/Water with acreage breakdowns

Site Information Bubble

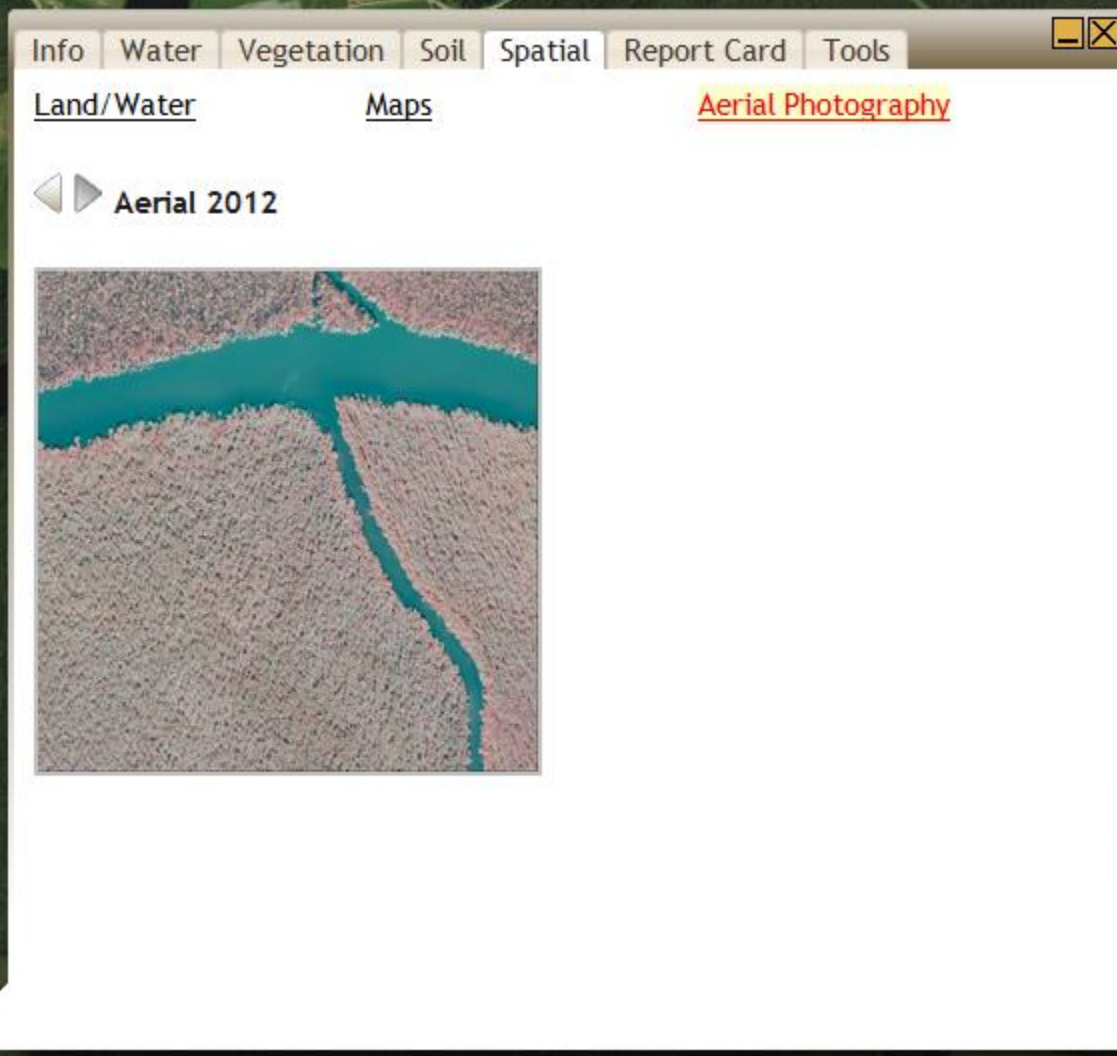
The Spatial tab contains all spatial information for the selected site.

CRMS site land/water maps at the 1km² scale.



[pdf link](#)

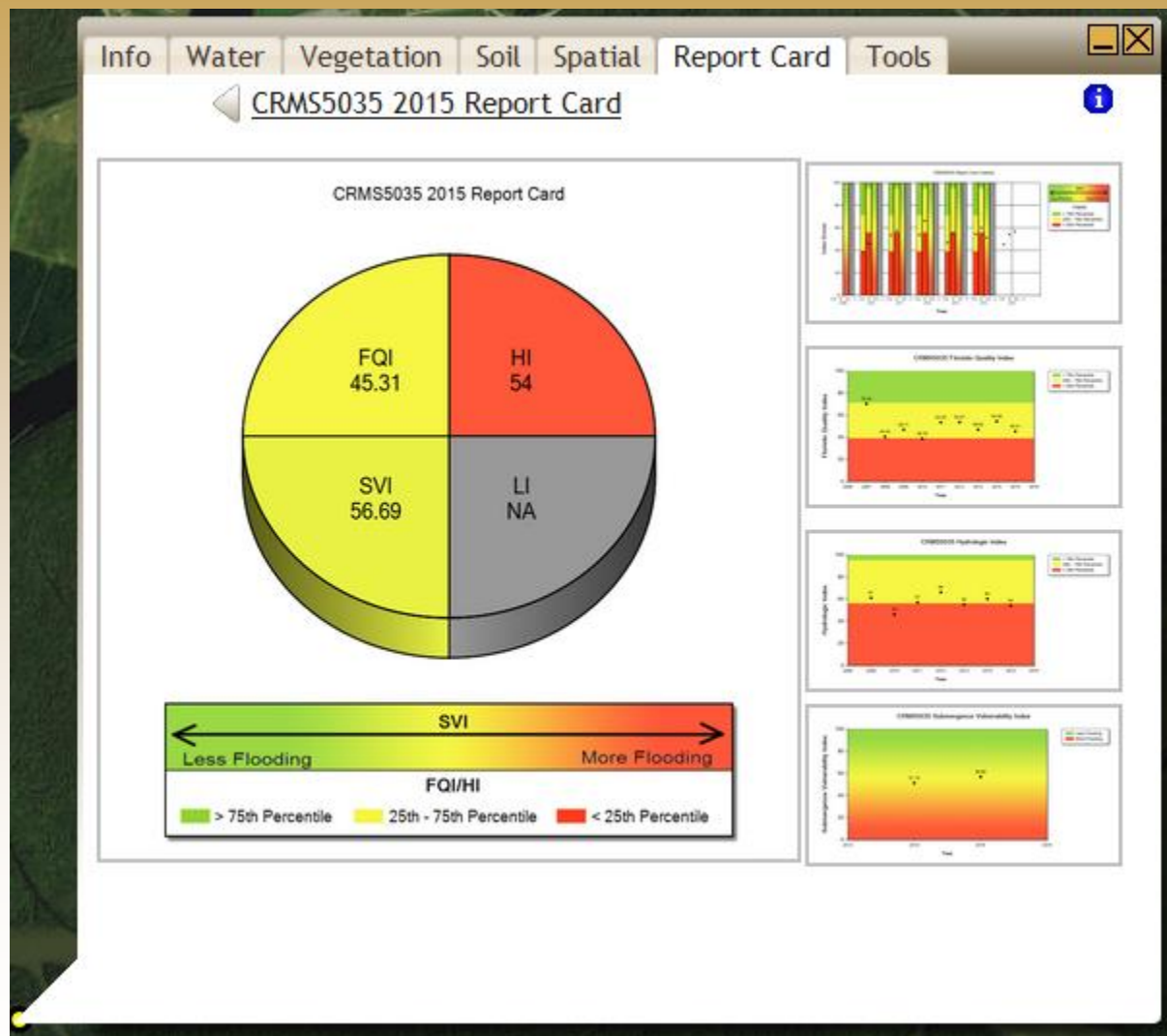
Site Information Bubble



The Spatial tab contains all spatial information for the selected site.

Aerial Photography

Site Information Bubble



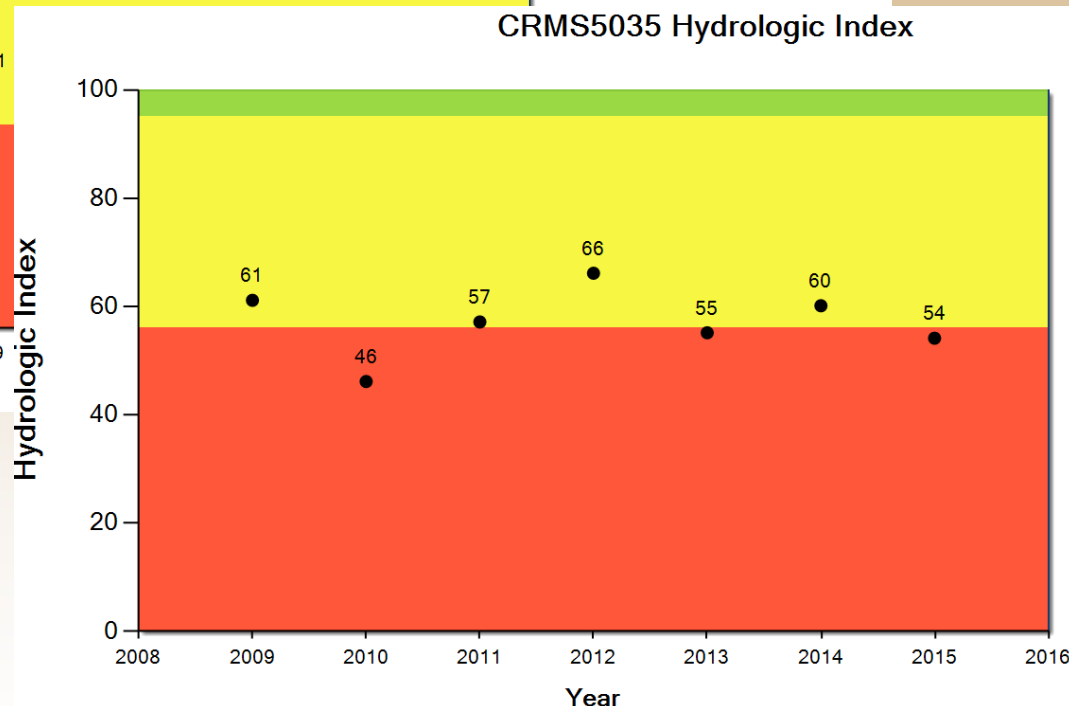
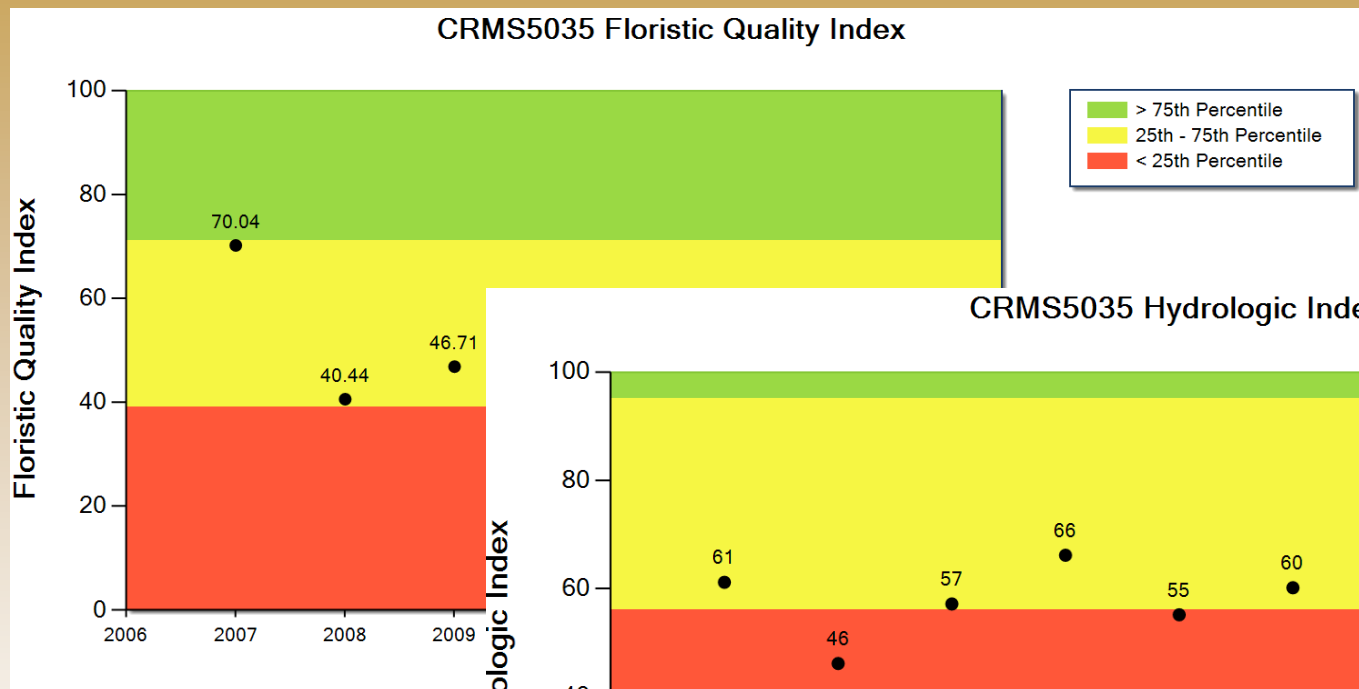
The Report Card tab contains all report card information for the selected site.

Report Card- Generate site report cards for previous years in the bubble or look at summary graphics.

Click on thumbnails to expand graphics.



Site Information Bubble



Report Card Summary Graphics- Allow you to visualize individual index scores through time for a particular site.

Site Information Bubble



The Tools tab lets you do an Acreage Assessment on the selected site.

Acreage Assessment – Use the acreage assessment tool to determine acreage breakdowns of the available coastwide vegetation surveys or land/water data.

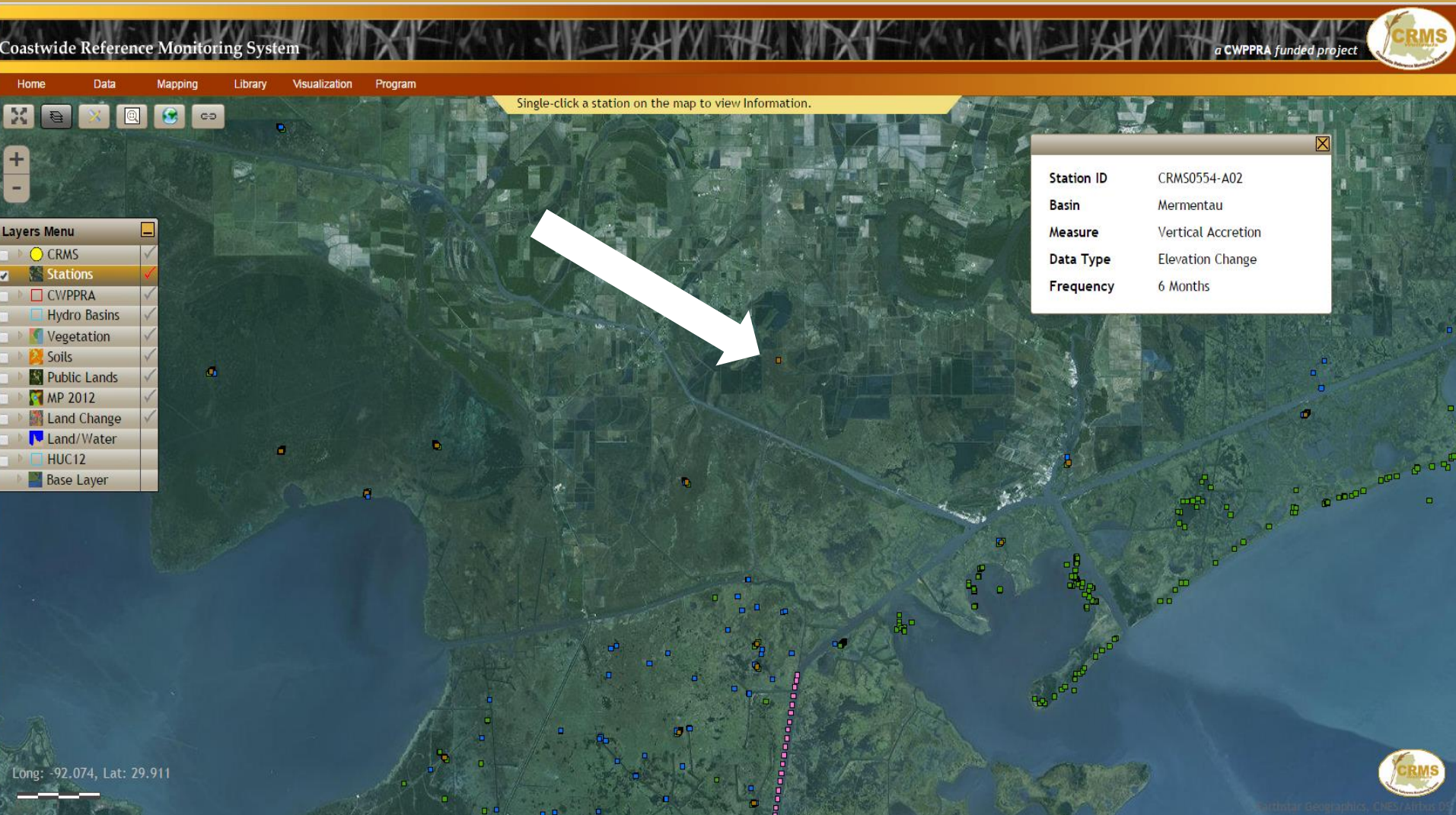


Coastwide Reference Monitoring System – Wetlands *Stations Layer*





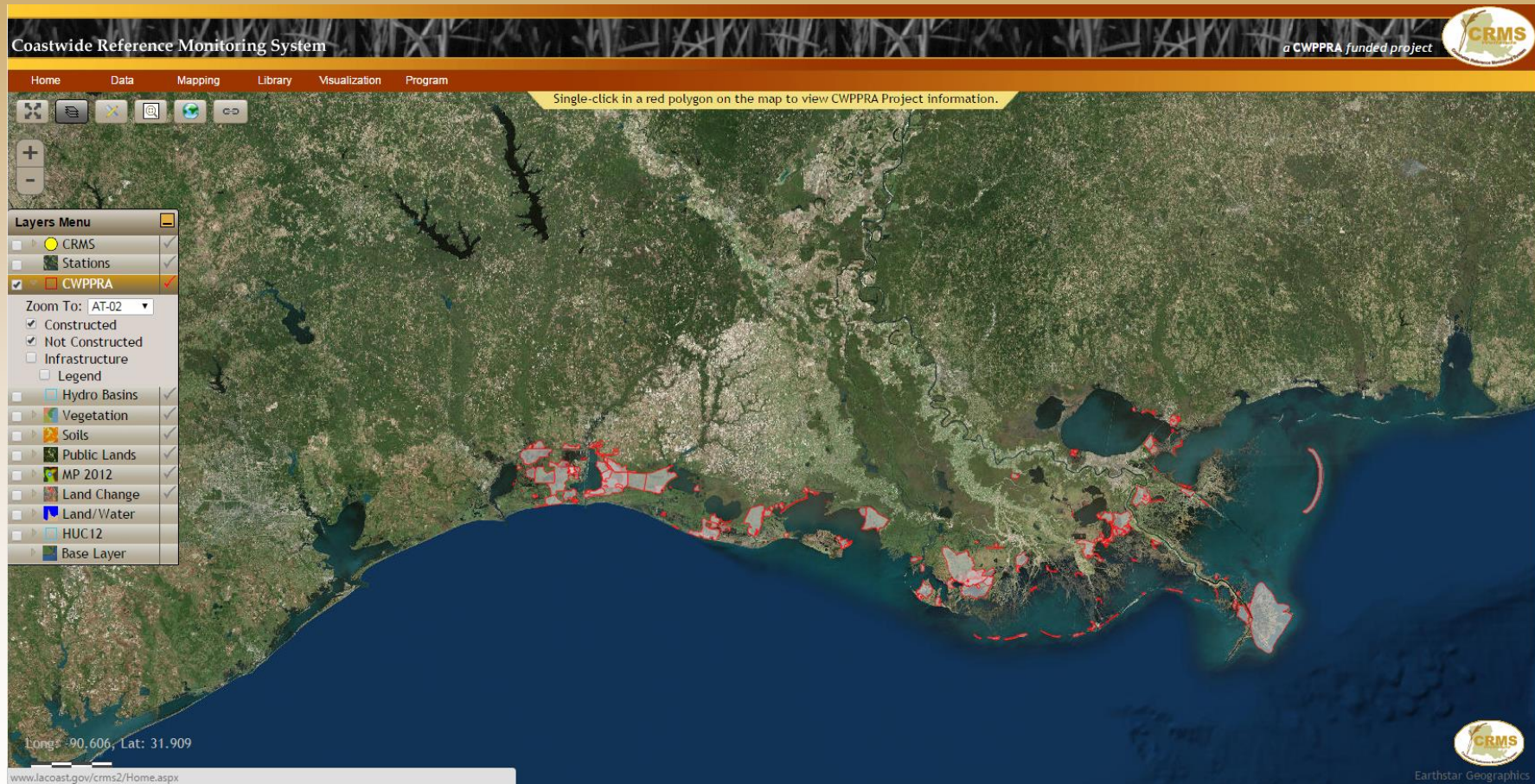
Coastwide Reference Monitoring System – Wetlands Stations Layer



Points on the map display a brief description of the station's information



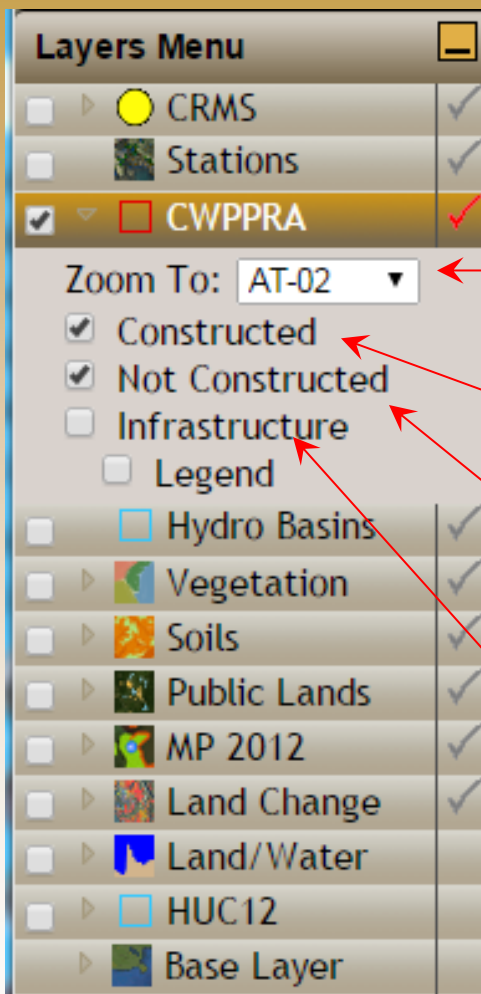
Coastwide Reference Monitoring System – Wetlands Project Level Information





Coastwide Reference Monitoring System – *Wetlands*

Project Level Information



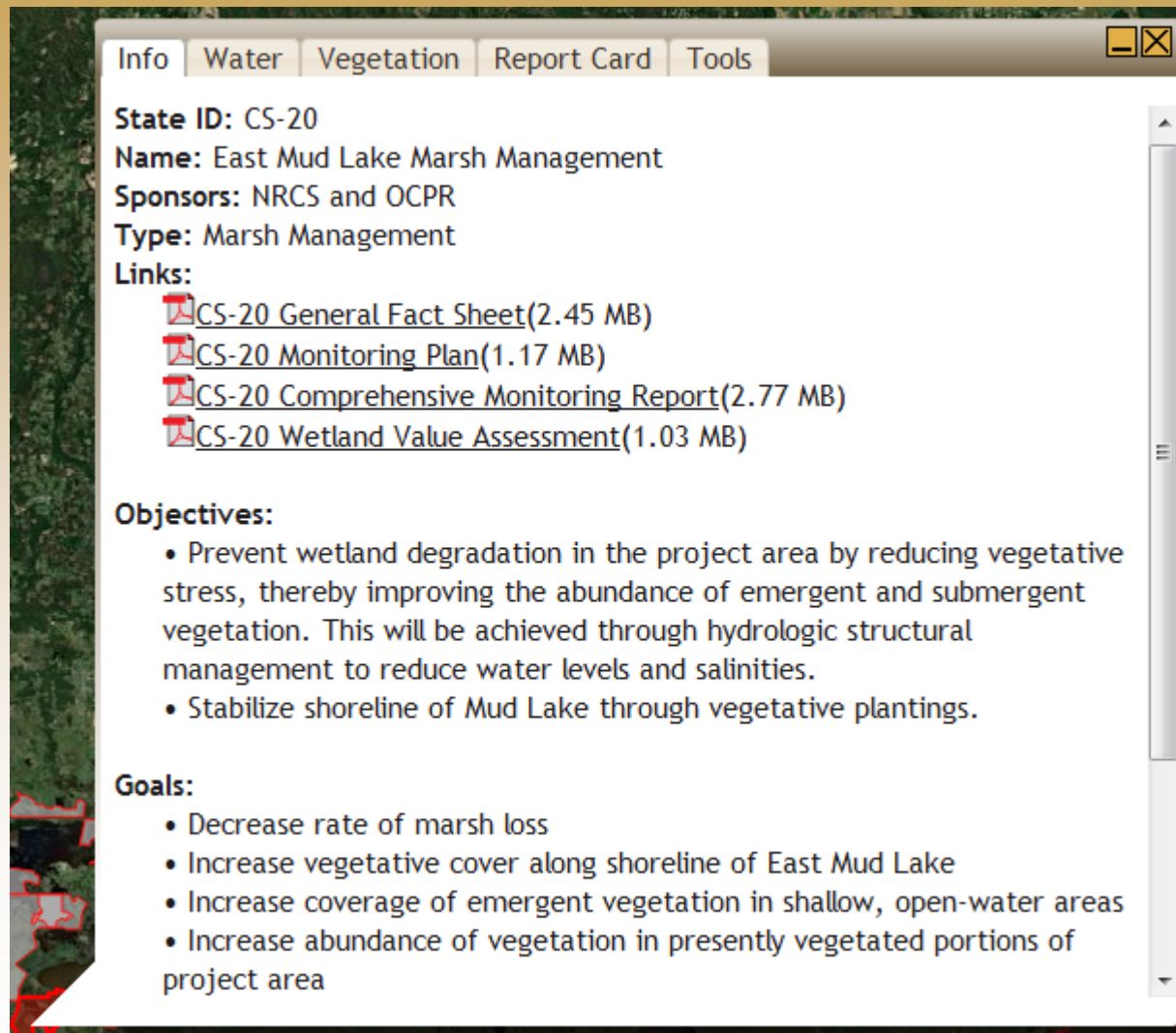
Zoom to function zooms to the project and shows the information bubble for it.

Adds/removes the Constructed projects layer to the map.

Adds/removes the “planning” projects layer to the map.

Adds/removes the Project Infrastructure layer to the map and shows the legend

Project Information Bubble

A screenshot of a web application window titled "Project Information Bubble". The window has a tabbed interface with tabs for "Info", "Water", "Vegetation", "Report Card", and "Tools". The "Info" tab is selected. The content area displays the following information:

State ID: CS-20
Name: East Mud Lake Marsh Management
Sponsors: NRCS and OCPR
Type: Marsh Management
Links:

- [CS-20 General Fact Sheet\(2.45 MB\)](#)
- [CS-20 Monitoring Plan\(1.17 MB\)](#)
- [CS-20 Comprehensive Monitoring Report\(2.77 MB\)](#)
- [CS-20 Wetland Value Assessment\(1.03 MB\)](#)

Objectives:

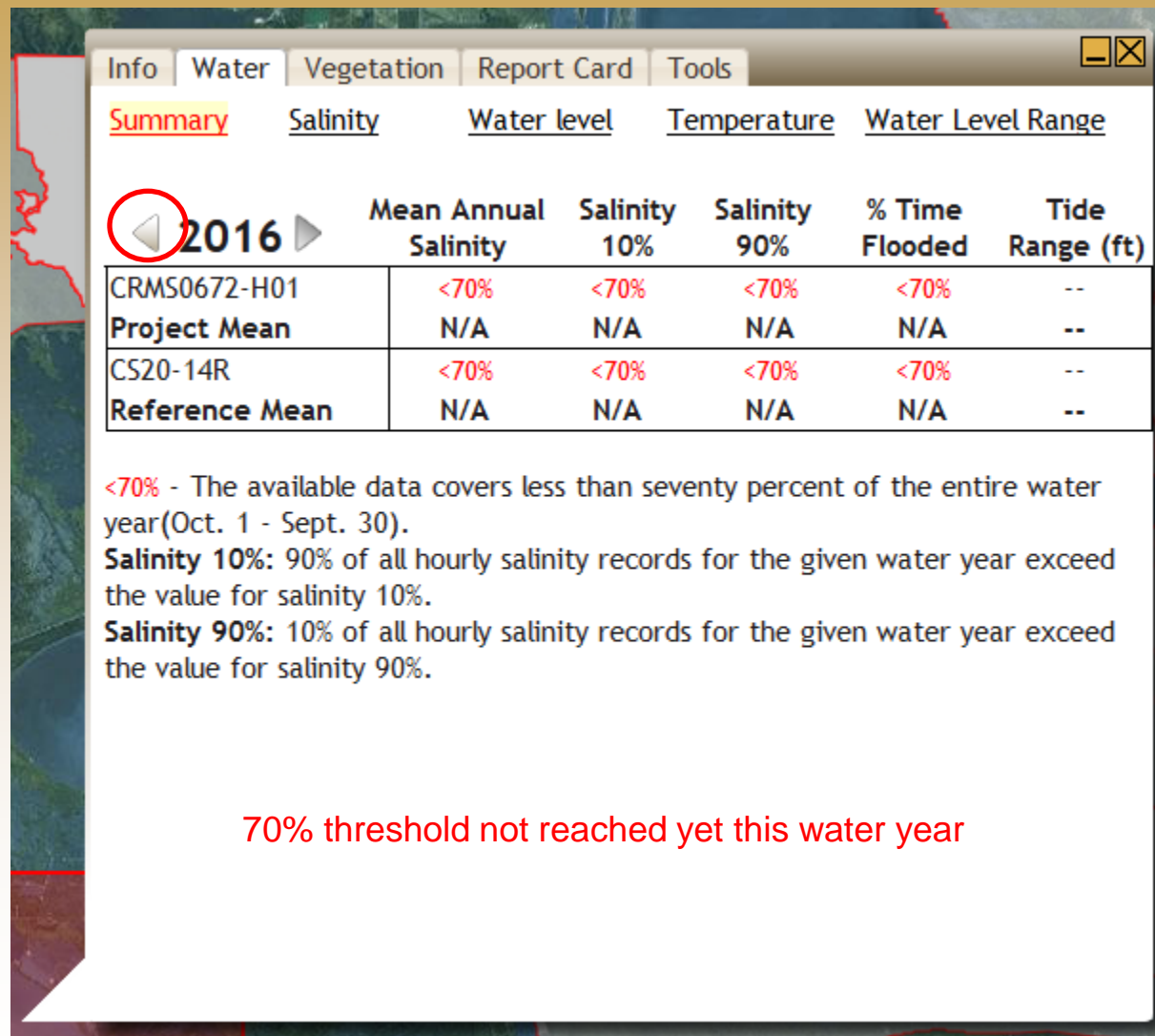
- Prevent wetland degradation in the project area by reducing vegetative stress, thereby improving the abundance of emergent and submergent vegetation. This will be achieved through hydrologic structural management to reduce water levels and salinities.
- Stabilize shoreline of Mud Lake through vegetative plantings.

Goals:

- Decrease rate of marsh loss
- Increase vegetative cover along shoreline of East Mud Lake
- Increase coverage of emergent vegetation in shallow, open-water areas
- Increase abundance of vegetation in presently vegetated portions of project area

The information bubble appears when a CWPPRA project is clicked. The Project Info tab is automatically chosen when the bubble pops up on the screen.

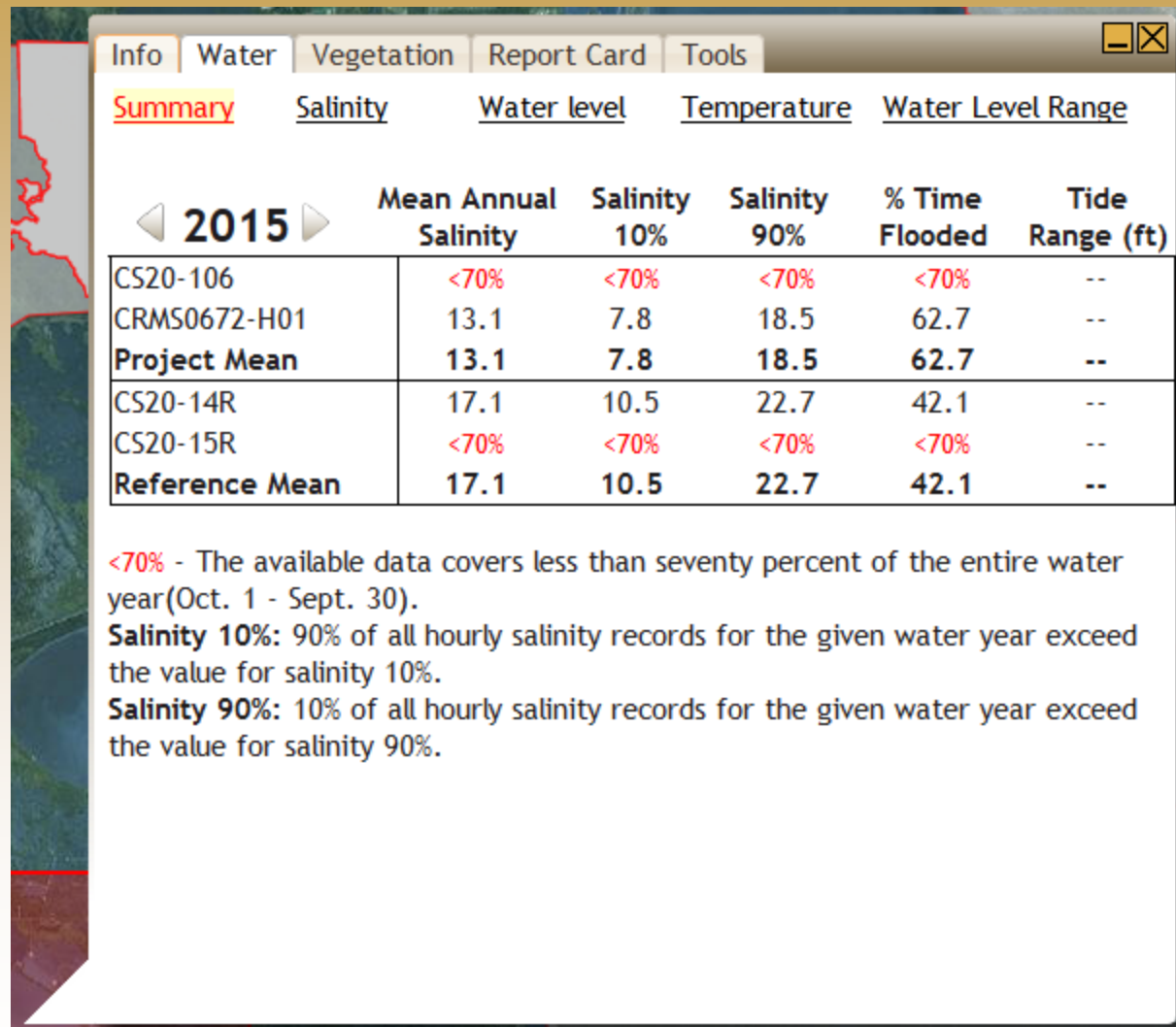
Project Information Bubble



The Water tab contains all hydrologic information for the selected project.

Summary – Gives a brief overview of the hydro data available for the project.

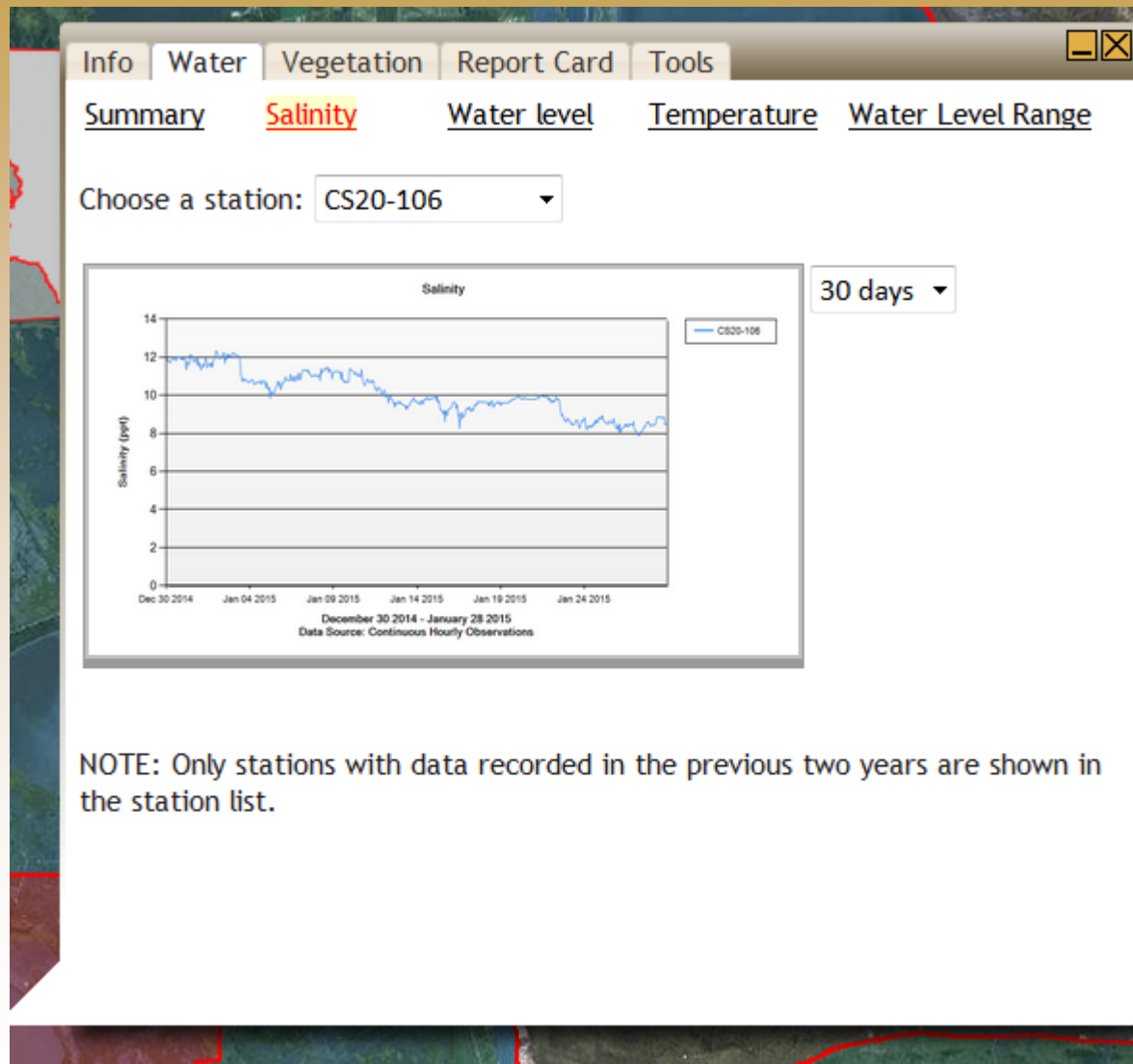
Project Information Bubble



The Water tab contains all hydrologic information for the selected project.

Summary – Gives a brief overview of the hydro data available for the project.

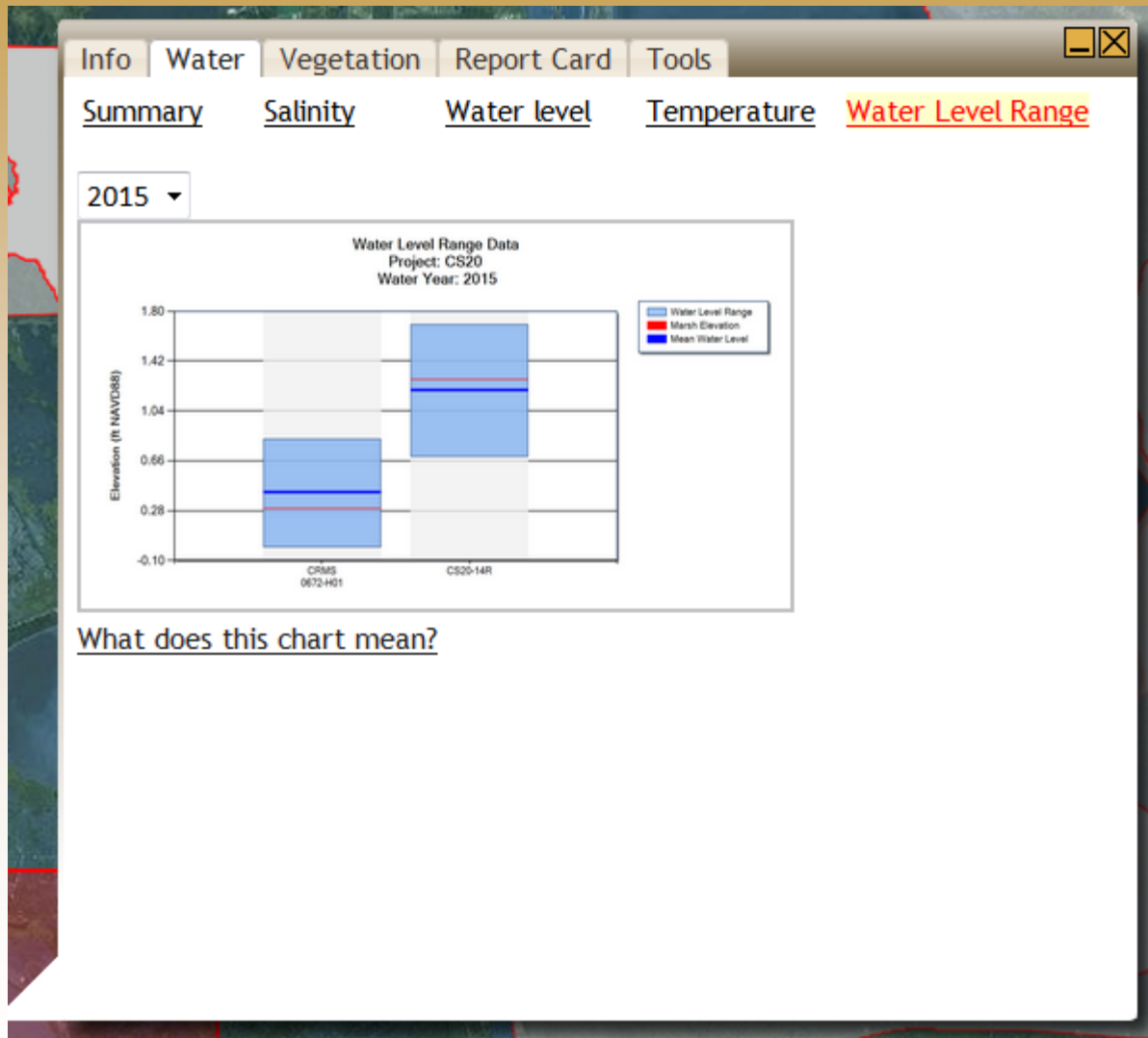
Project Information Bubble



The Water tab contains all hydrologic information for the selected project.

Salinity – Charts most recent data for hydro stations located within the project.

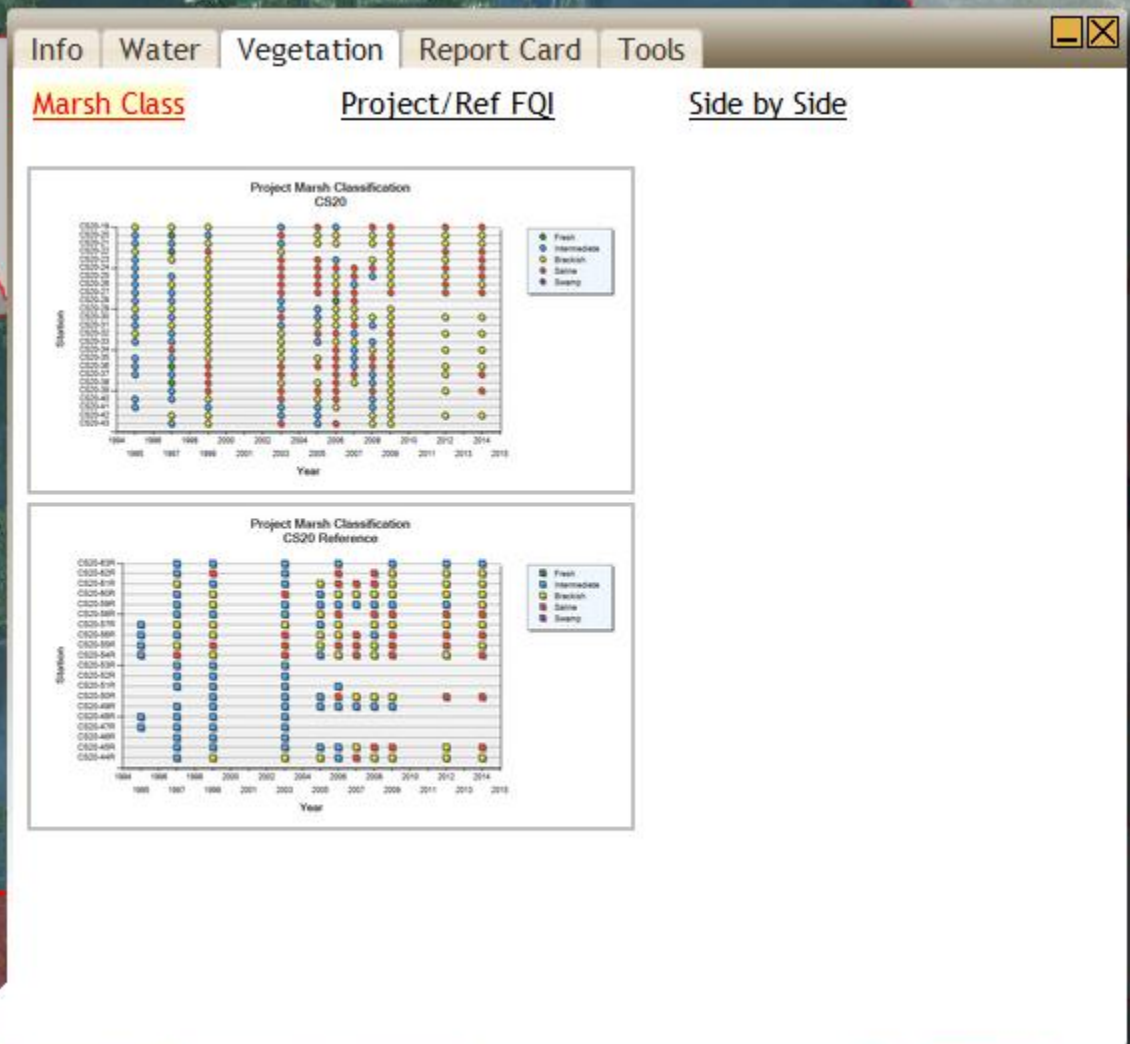
Project Information Bubble



The Water tab contains all hydrologic information for the selected project.

Water Level Range – Charts water level range data for **hydro stations located within the project.**

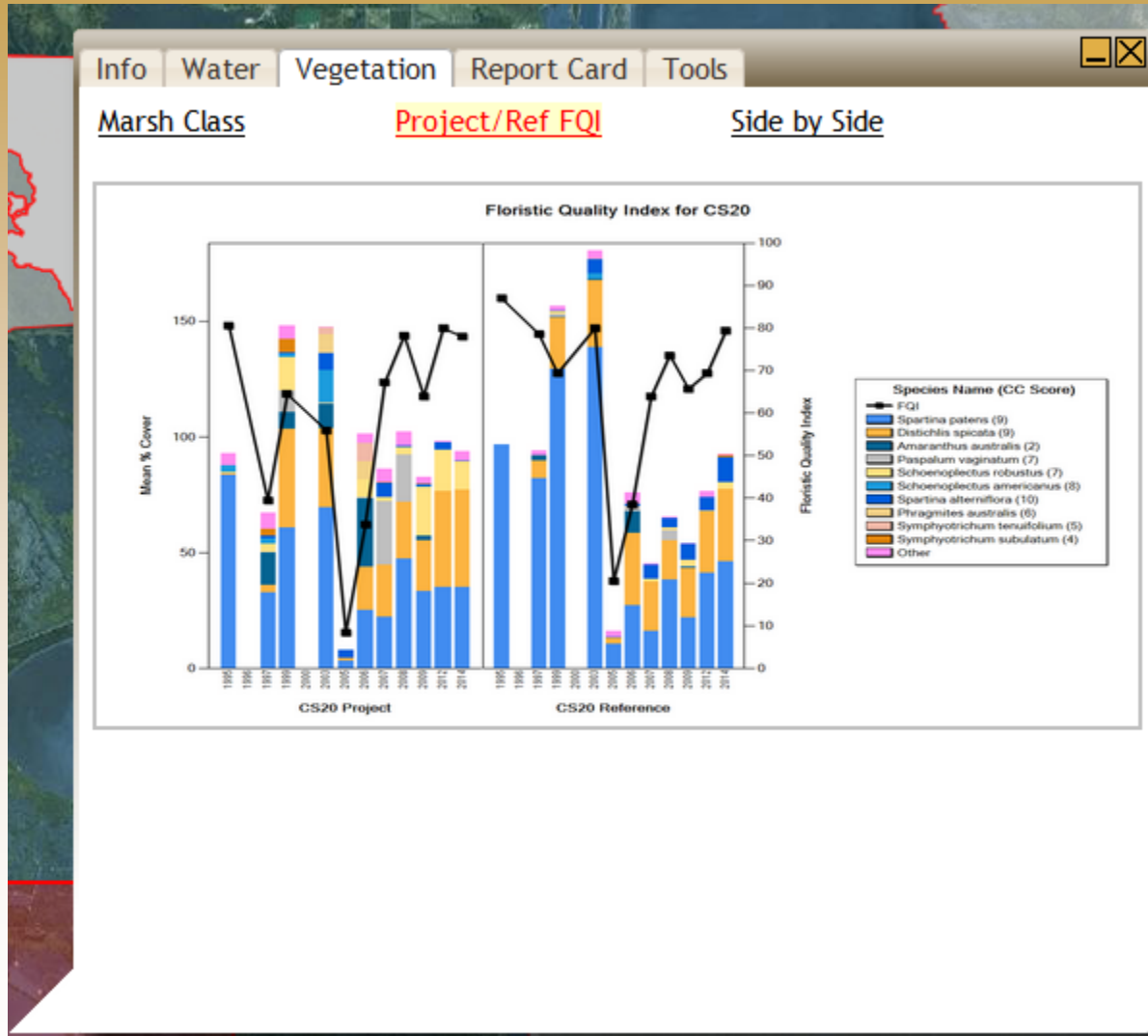
Project Information Bubble



The Vegetation tab contains all vegetation information for the selected project.

Marsh classification at project and reference stations over multiple years.

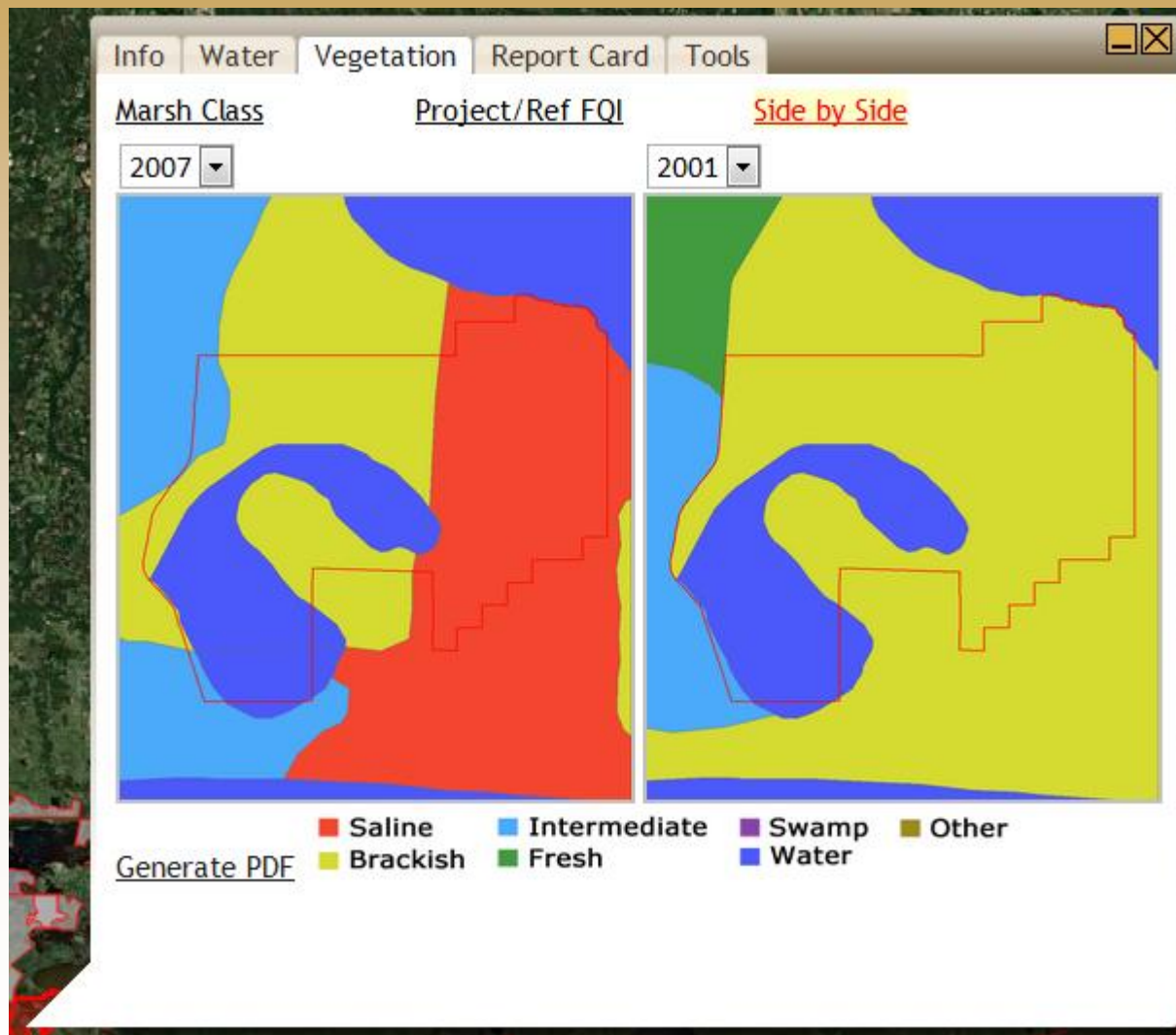
Project Information Bubble



The Vegetation tab contains all vegetation information for the selected project.

Project/Ref FQI – Project Scale Floristic Quality Index Chart.

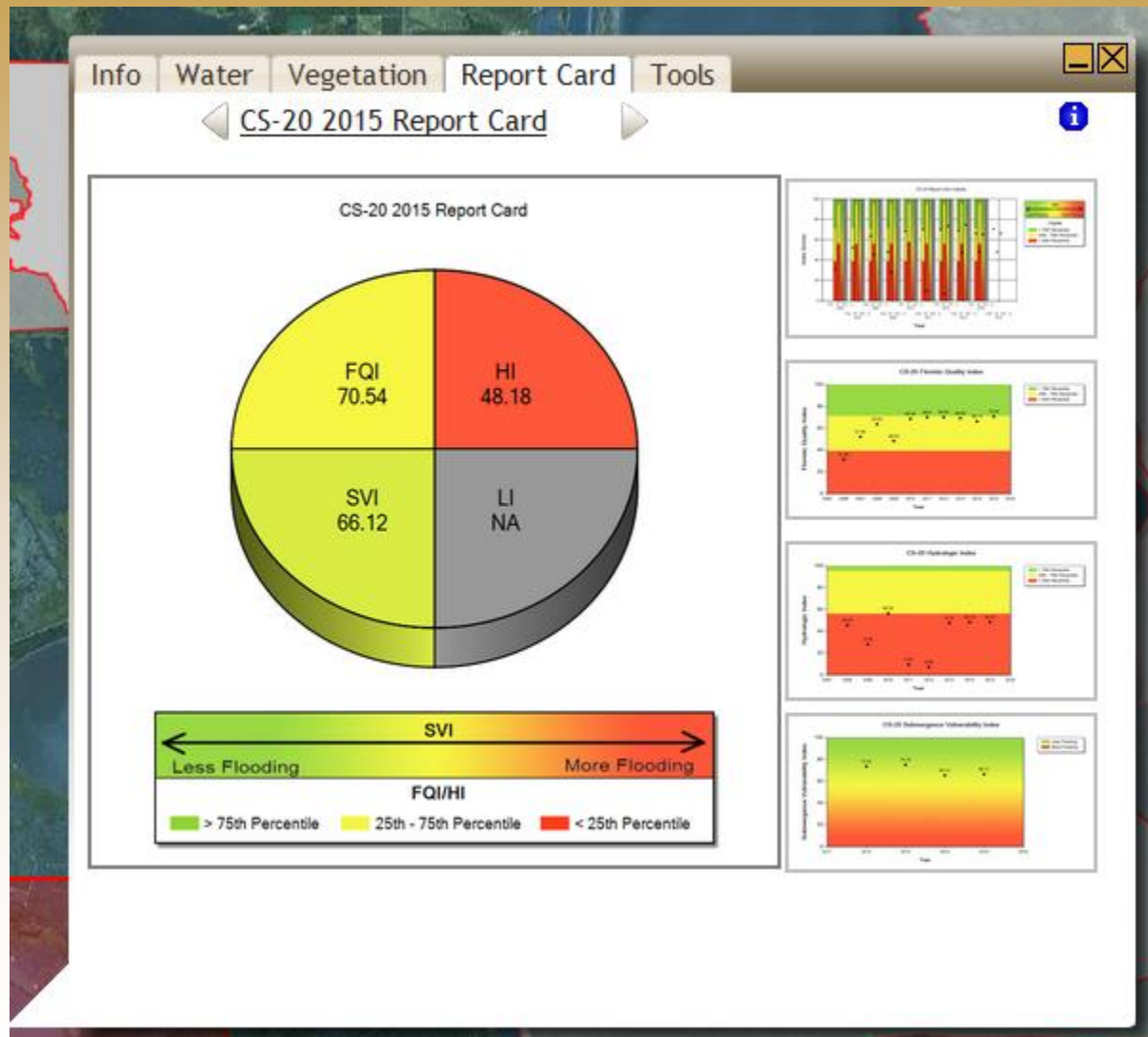
Project Information Bubble



The Vegetation tab contains all vegetation information for the selected project.

Side by Side – Side by side comparison of Marsh Class using the raster image created from helicopter surveys.

Project Information Bubble



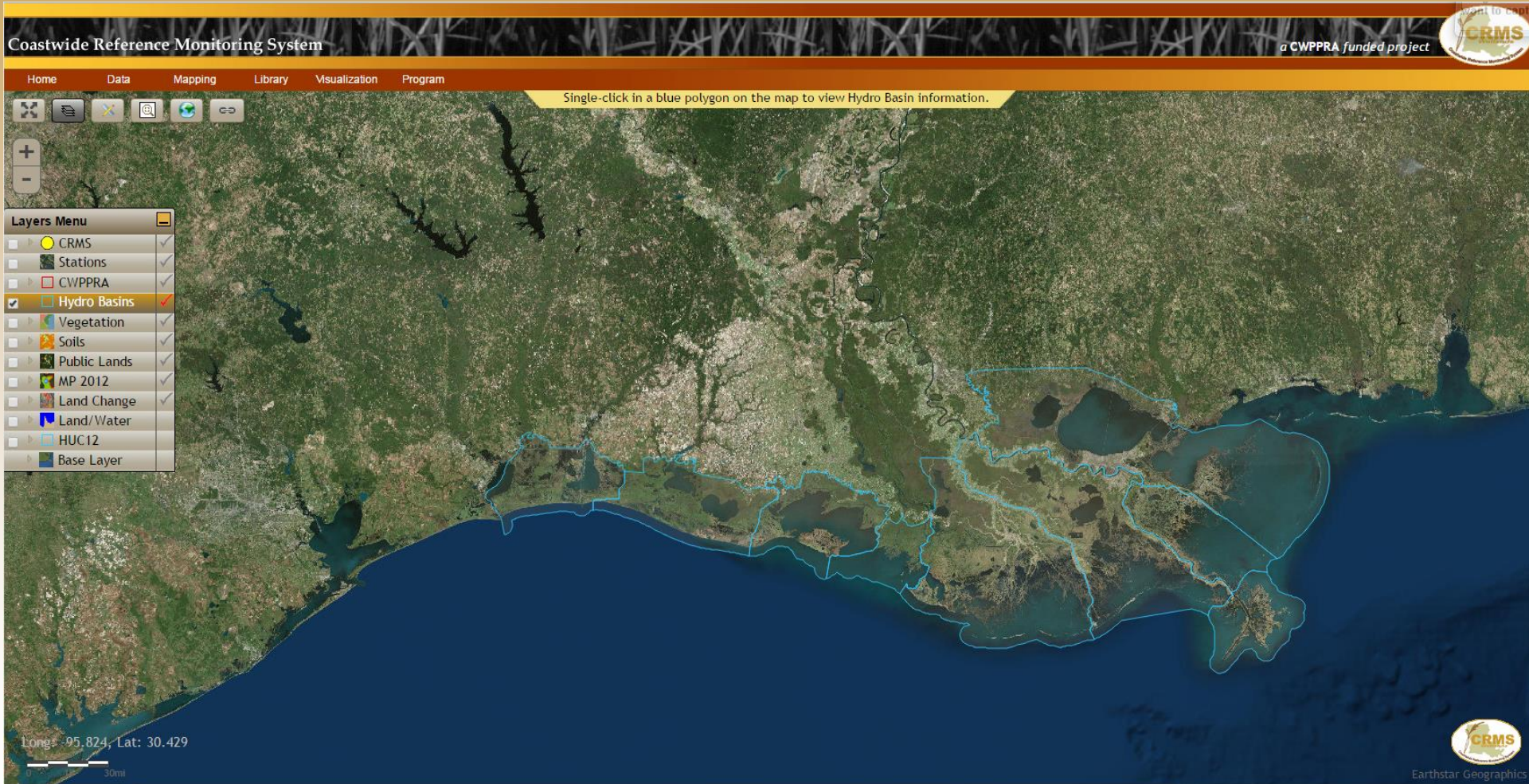
The Report Card tab contains all report card information for the selected project.

Report Card-Summary of project scale information compiled into a report card.

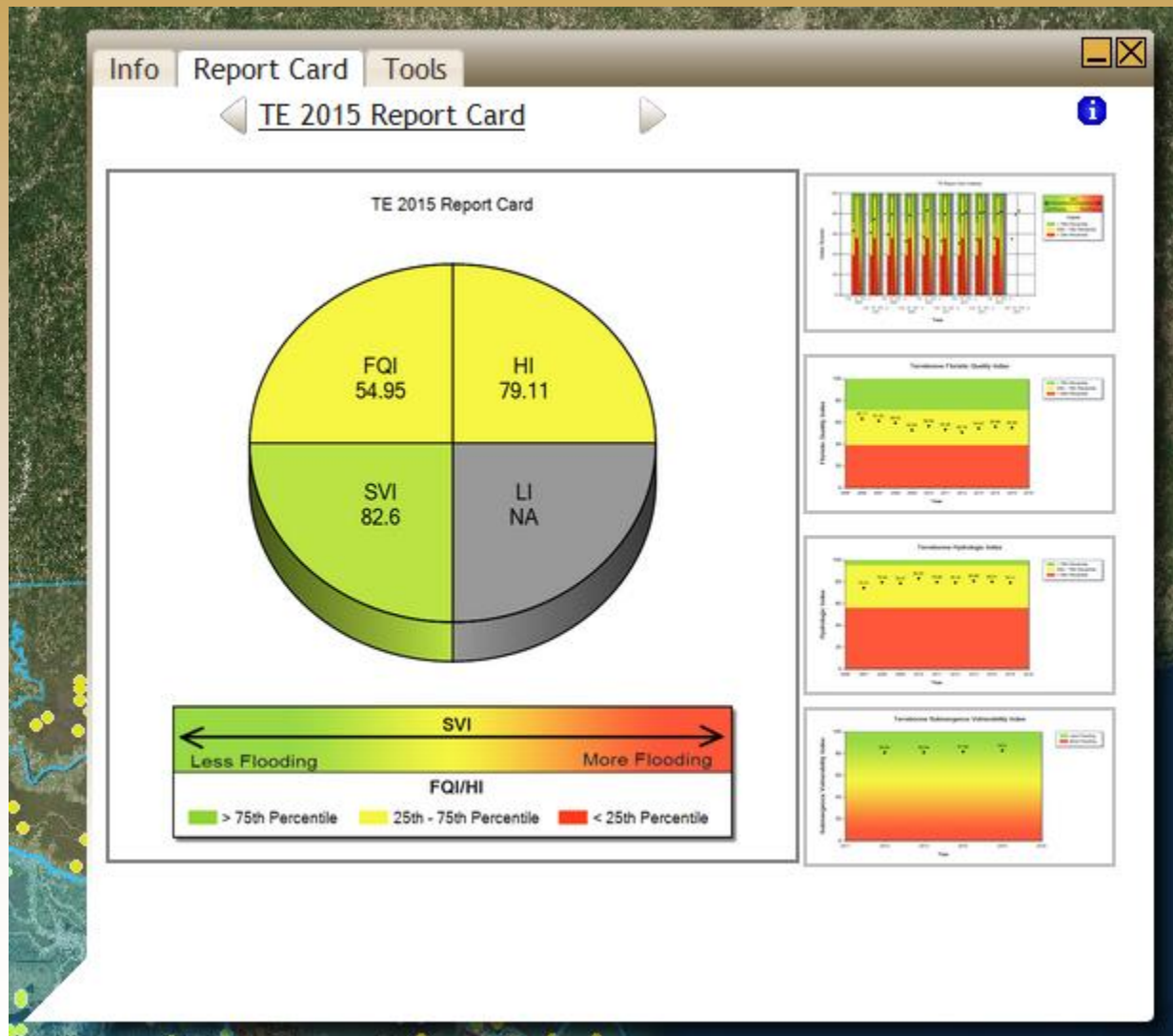


Coastwide Reference Monitoring System – Wetlands Hydrologic Basin Layer

Hydrologic basins as defined by CWPPRA



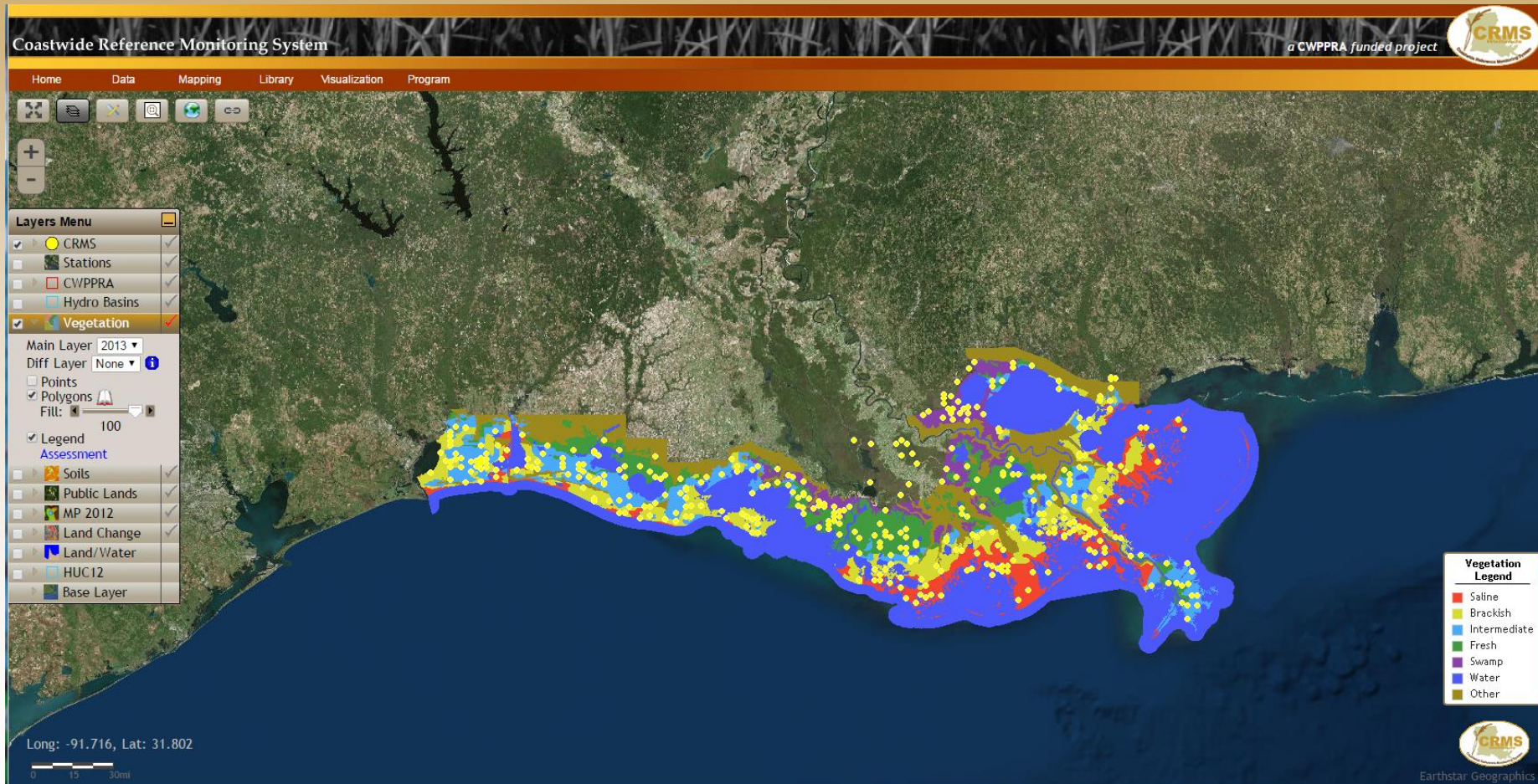
Basin Information Bubble



The Report Card tab contains all report card information for the selected basin.

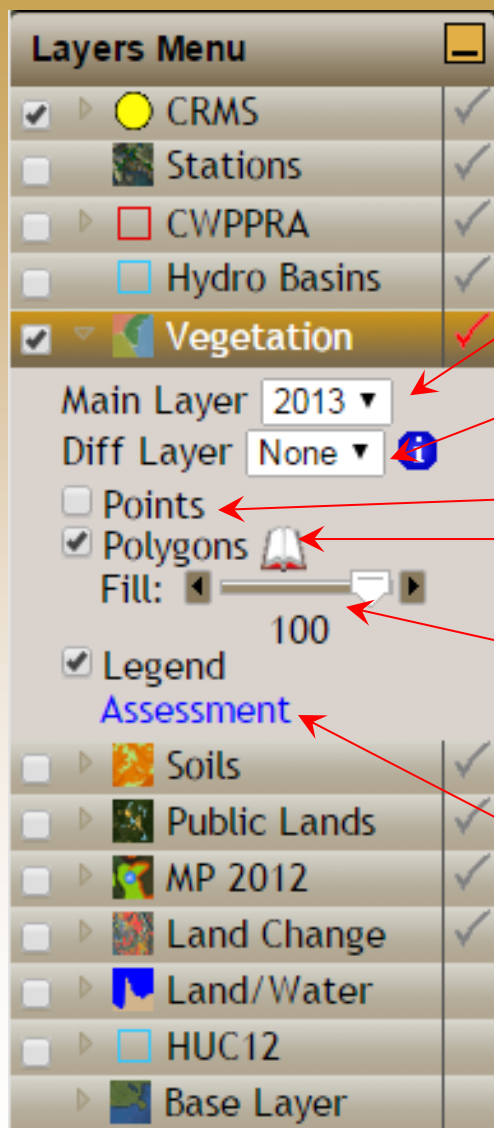
Report Card – Summary of basin scale information compiled into a report card.

Vegetation classification based on helicopter surveys, O'Neil 1949 through Sasser et al. 2013, 8 surveys





Coastwide Reference Monitoring System – *Wetlands* Vegetation Layer



Main Year selects the primary polygon layer on the map.

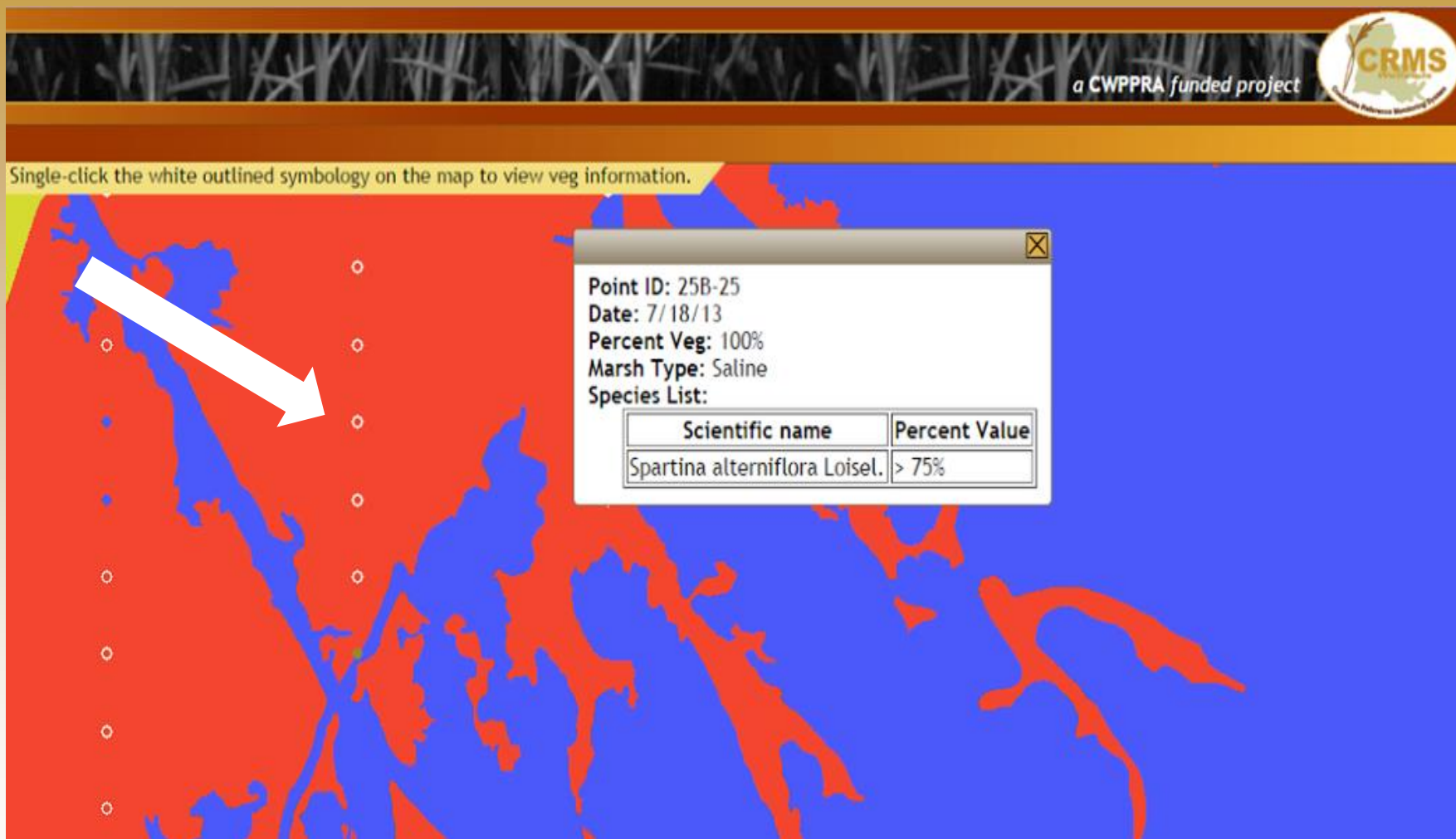
Diff Year selects the secondary polygon layer on the map.

Adds/removes the vegetation data points.

Adds/removes the vegetation polygons layer.

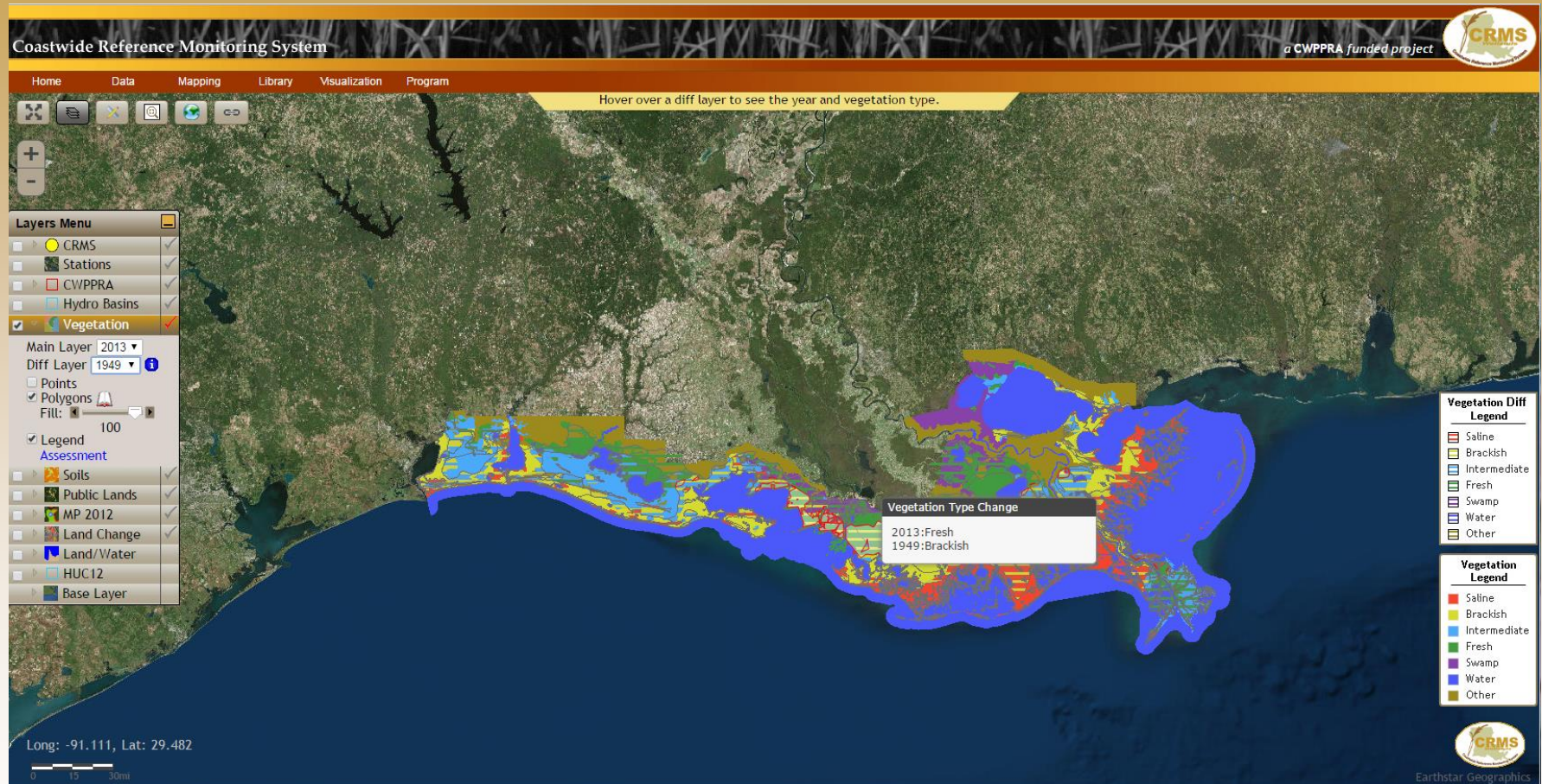
The slider changes the transparency of the layer.

Assessment link invokes the acreage assessment tool menu for the currently selected year.



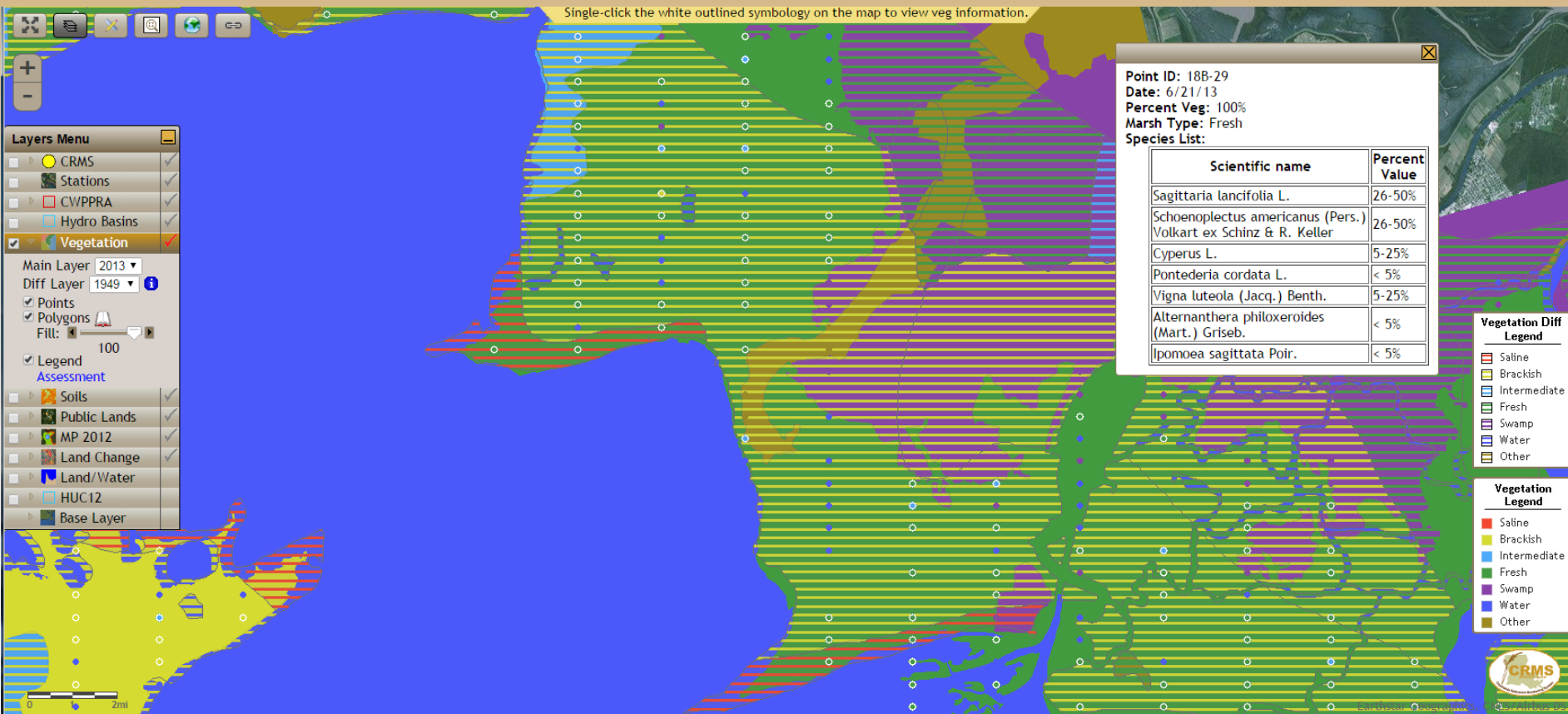
Points display the site specific vegetation data when clicked.

Vegetation Difference Layer Functionality

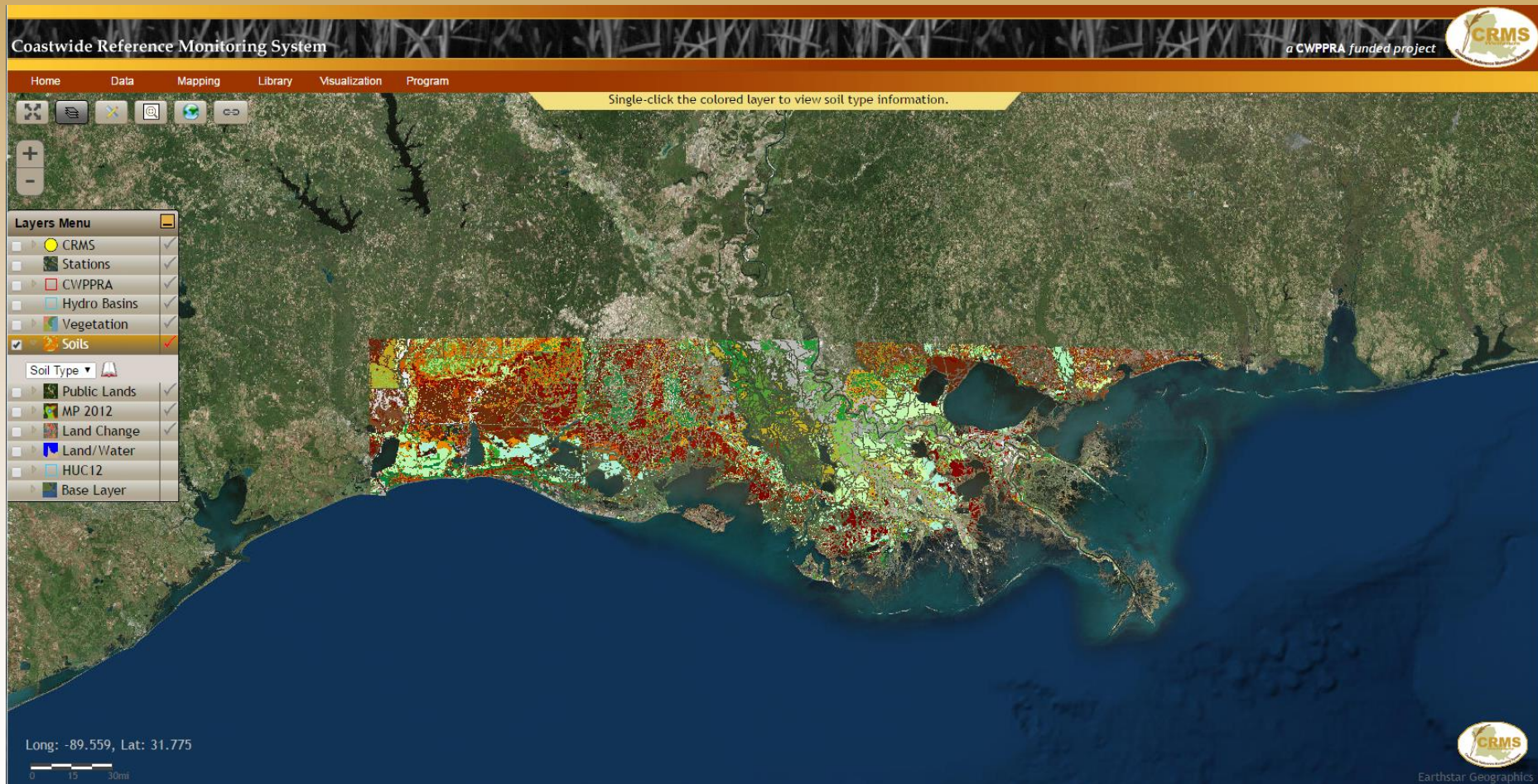


The “Vegetation Change” is shown when two different years are chosen for the Main Layer and Diff Layer.

Vegetation Difference Layer Functionality



NRCS SSURGO data displayed





Coastwide Reference Monitoring System – Wetlands Soils Layer

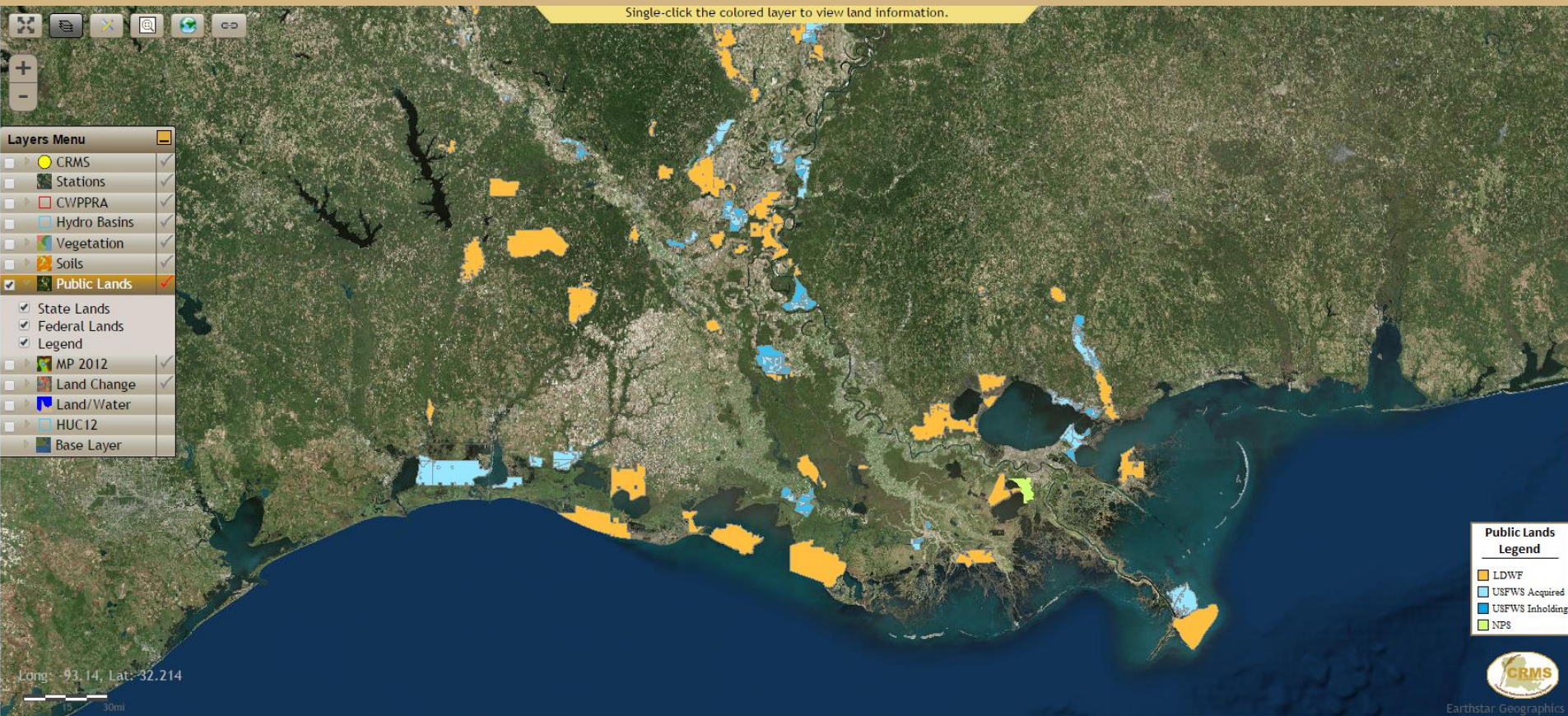


The Soil Type information window pops up when a soil area is clicked.



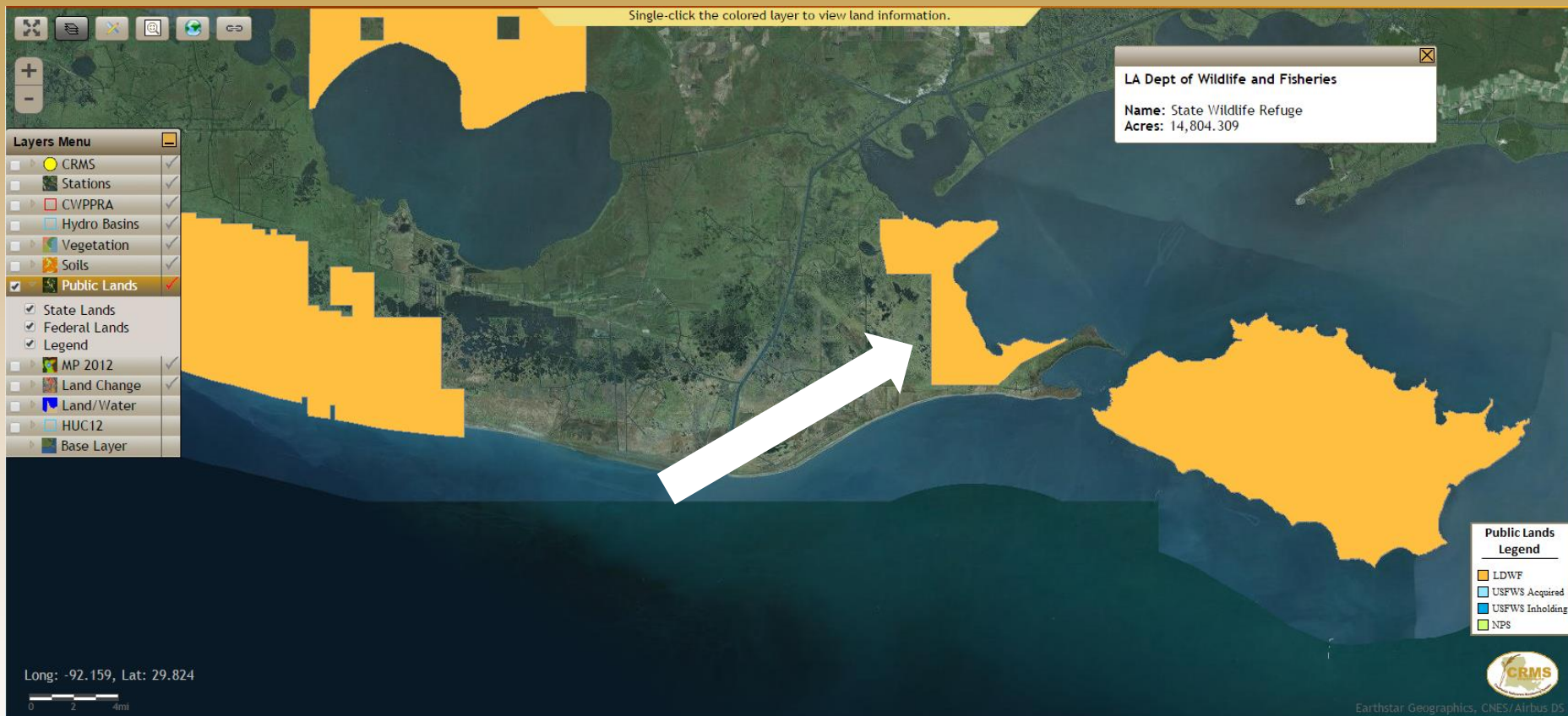
Coastwide Reference Monitoring System – *Wetlands* Public Lands Layer

Displays Federal (USFWS and NPS) and State (LDWF) land holdings.





Coastwide Reference Monitoring System – Wetlands Public Lands Layer



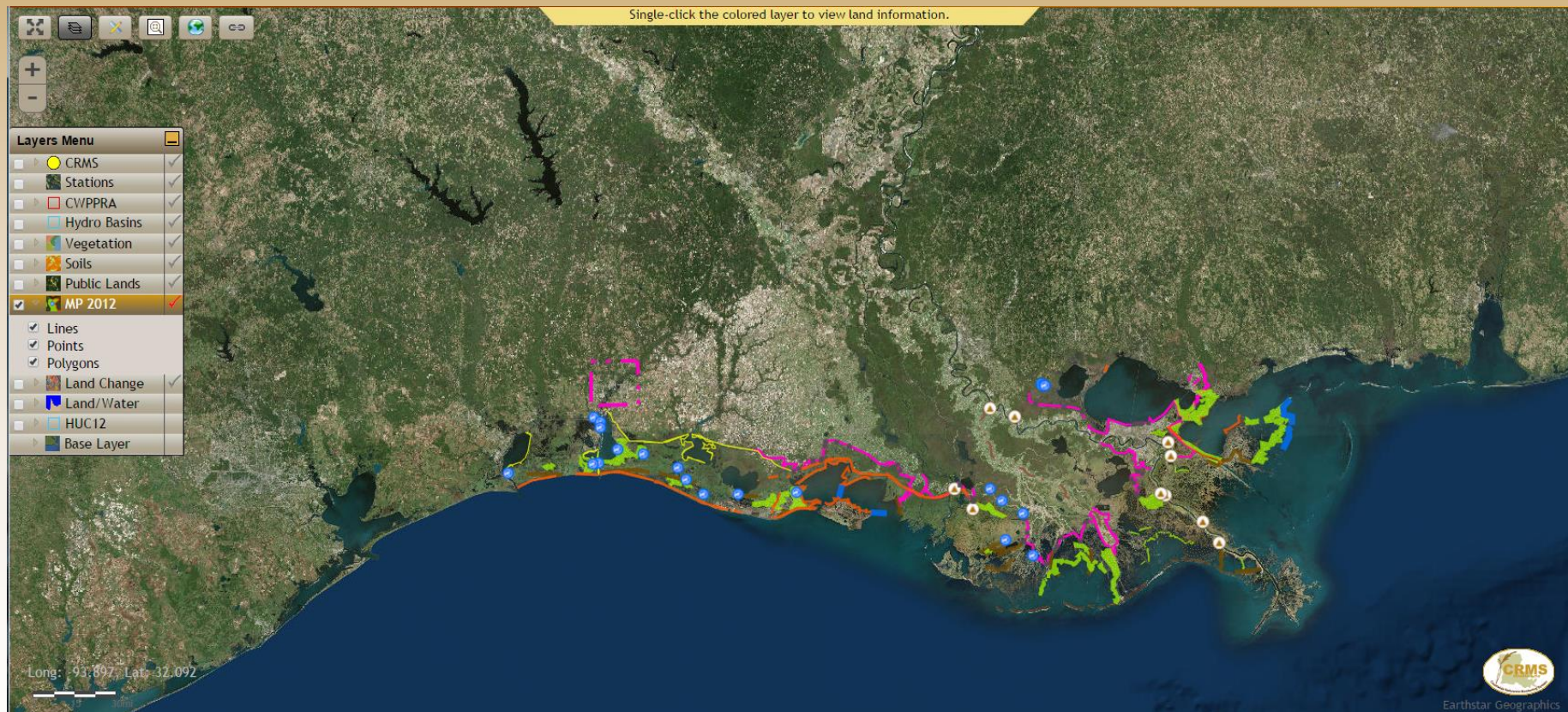
The Public Lands information window pops up when a Public Lands polygon is clicked.



Coastwide Reference Monitoring System – *Wetlands* Louisiana's Comprehensive Master Plan 2012 Layer

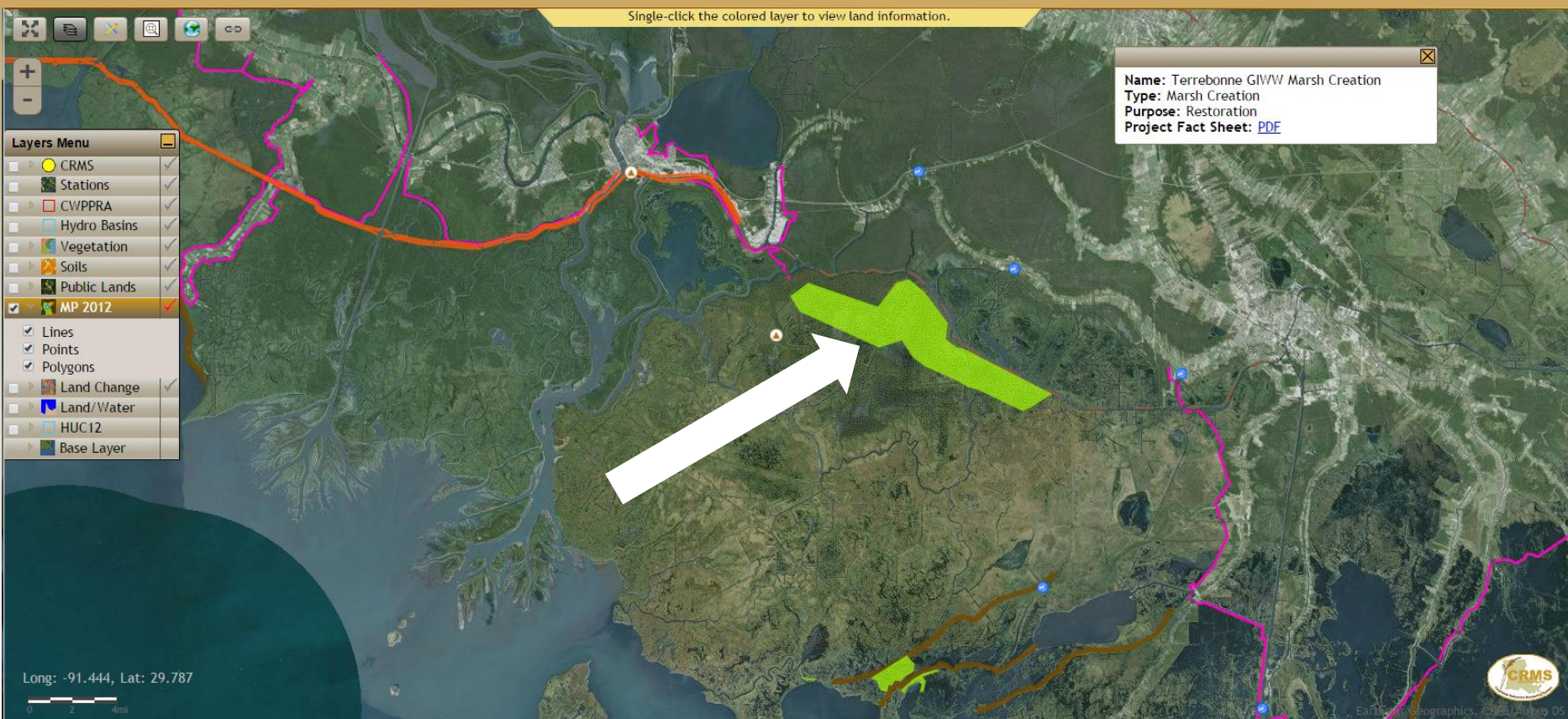
Master Plan project types and general project areas.

Additional visualizations of this information available through CIMS.





Coastwide Reference Monitoring System – *Wetlands* Louisiana's Comprehensive Master Plan 2012 Layer



The Master Plan information window providing project information pops up when a symbology is clicked.

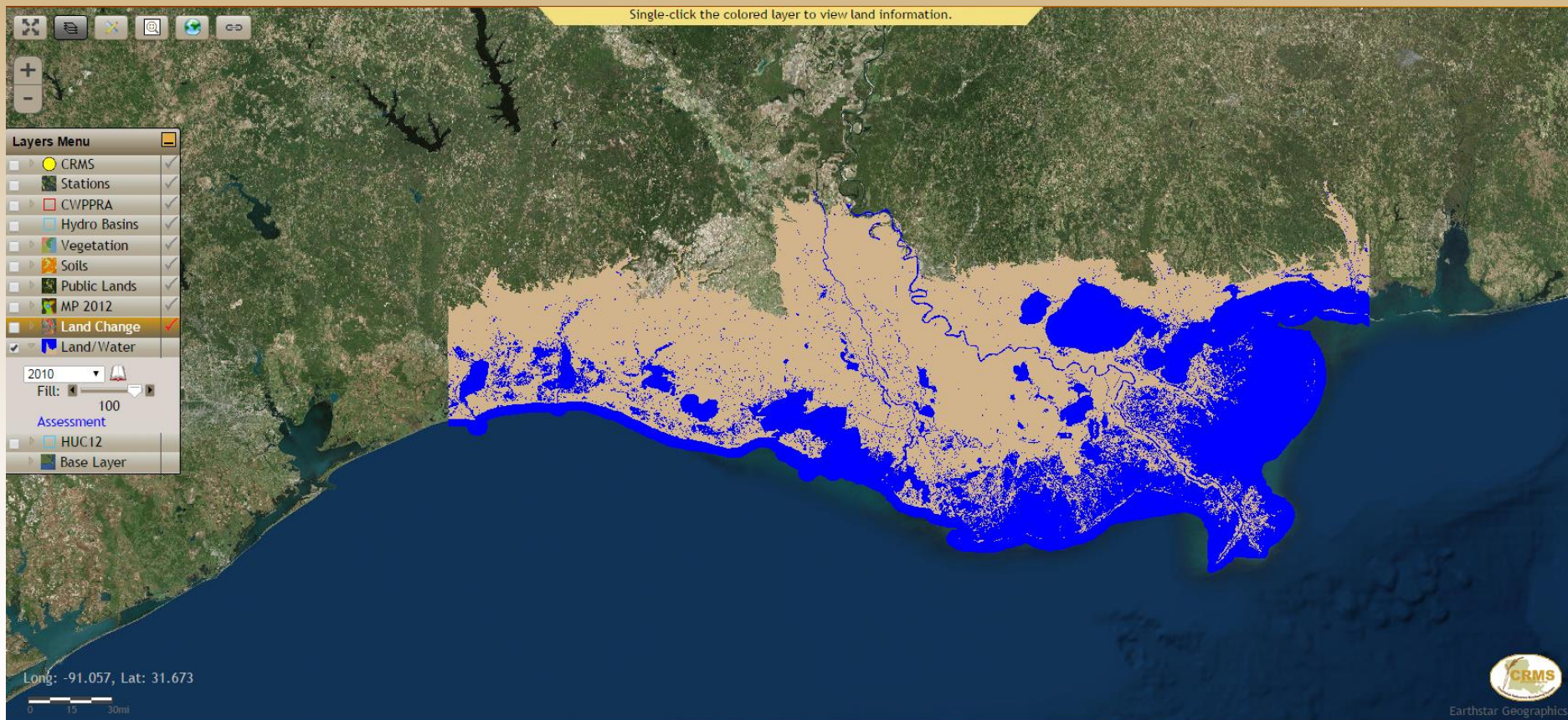
Couvillion et al., 2011. Land Area Change in Coastal Louisiana from 1932 to 2010.

Displays land change (both loss and gain) broken down by time intervals.



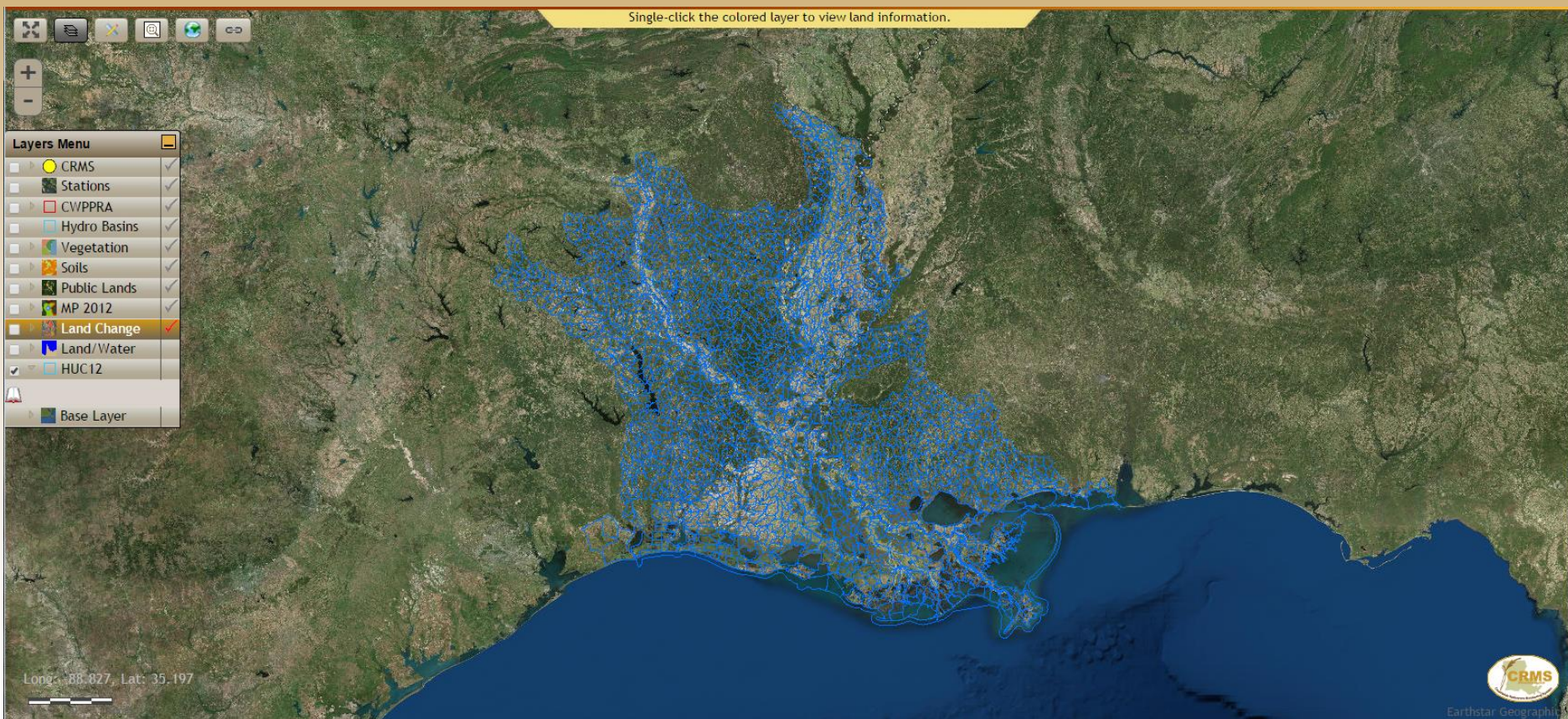
Land/Water classifications from 1932 to 2010

18 classification dates based on satellite imagery, 30m resolution.





NRCS's Hydrologic Unit Code (HUC) Boundaries—12 digit subwatershed classification

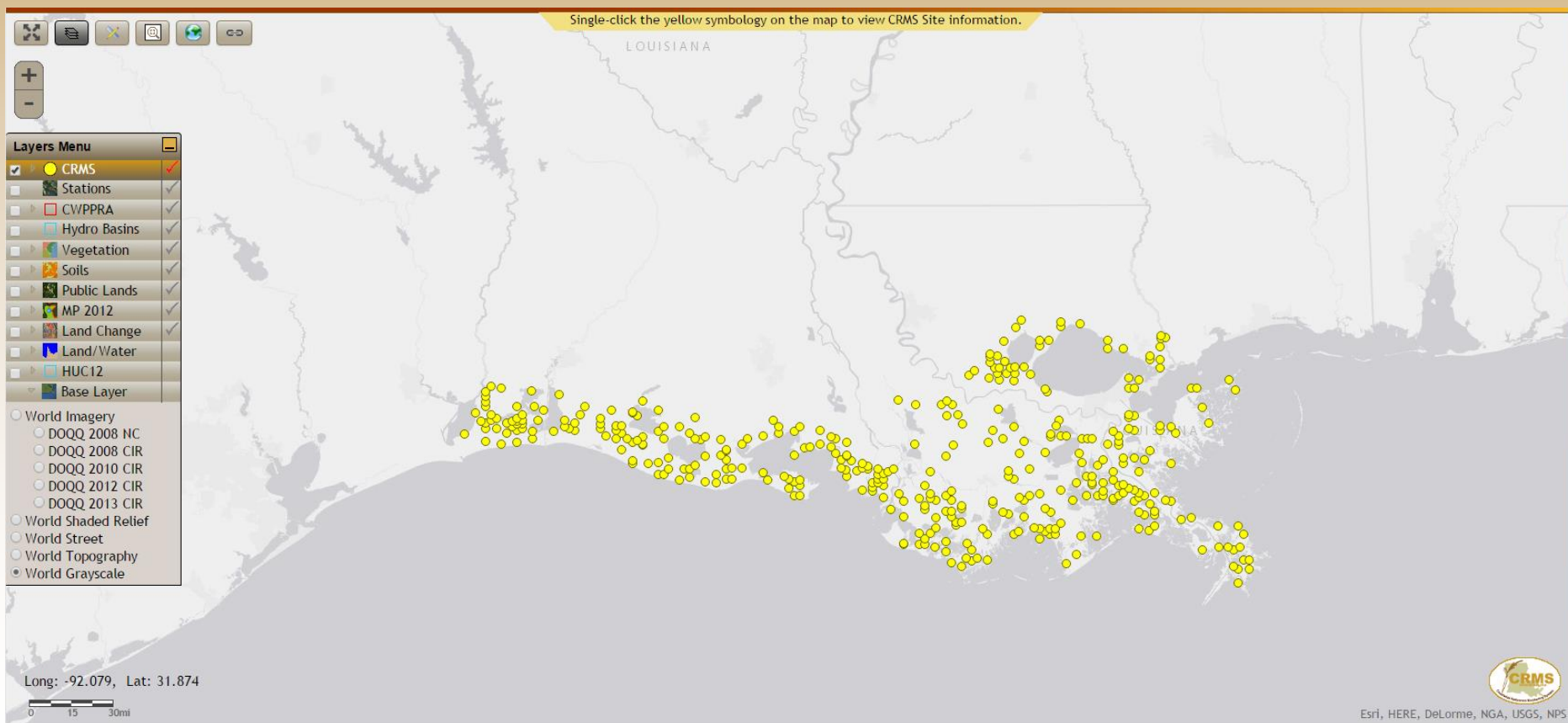




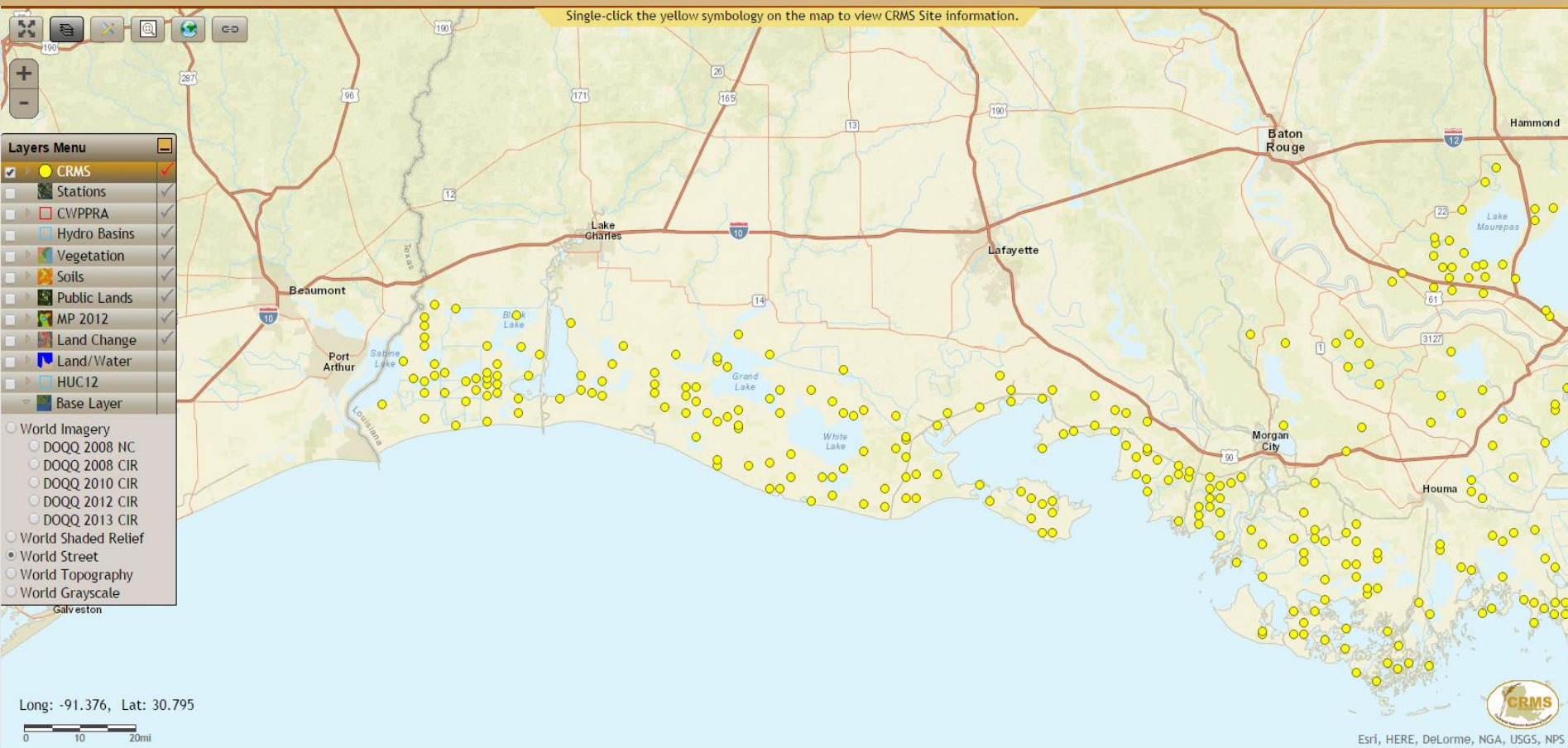
Coastwide Reference Monitoring System – *Wetlands*

Optional Base Layers

Ability to visualize the base map layer as different years of aerial photography or world imagery.



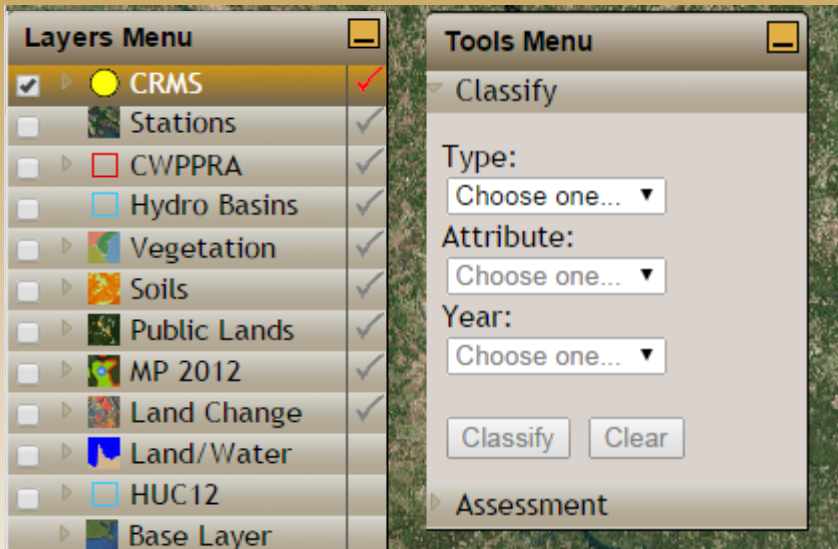
Streets Base Layer





Classify Tool- allows all CRMS sites to be visualized based on user-selected parameters.

A Type, Attribute, and Year must be chosen to Classify the CRMS sites.



- **Vegetation**

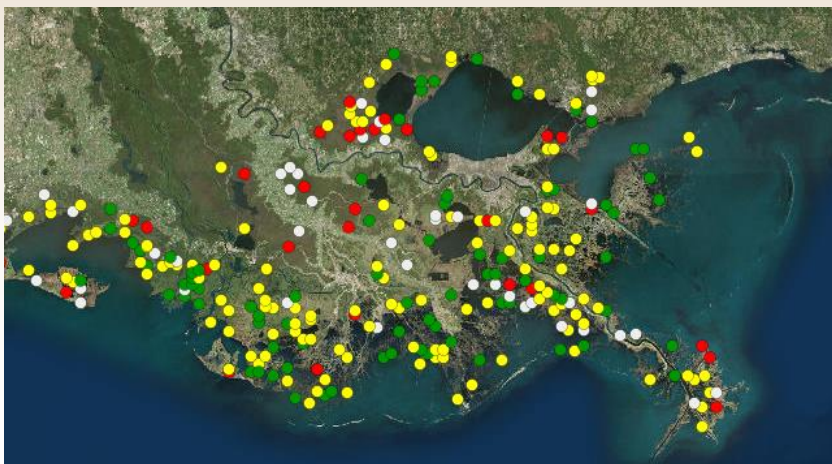
- FQI
- Marsh Classification

- **Hydro**

- Hydro Index
- Salinity
- Water Level

- **Soil**

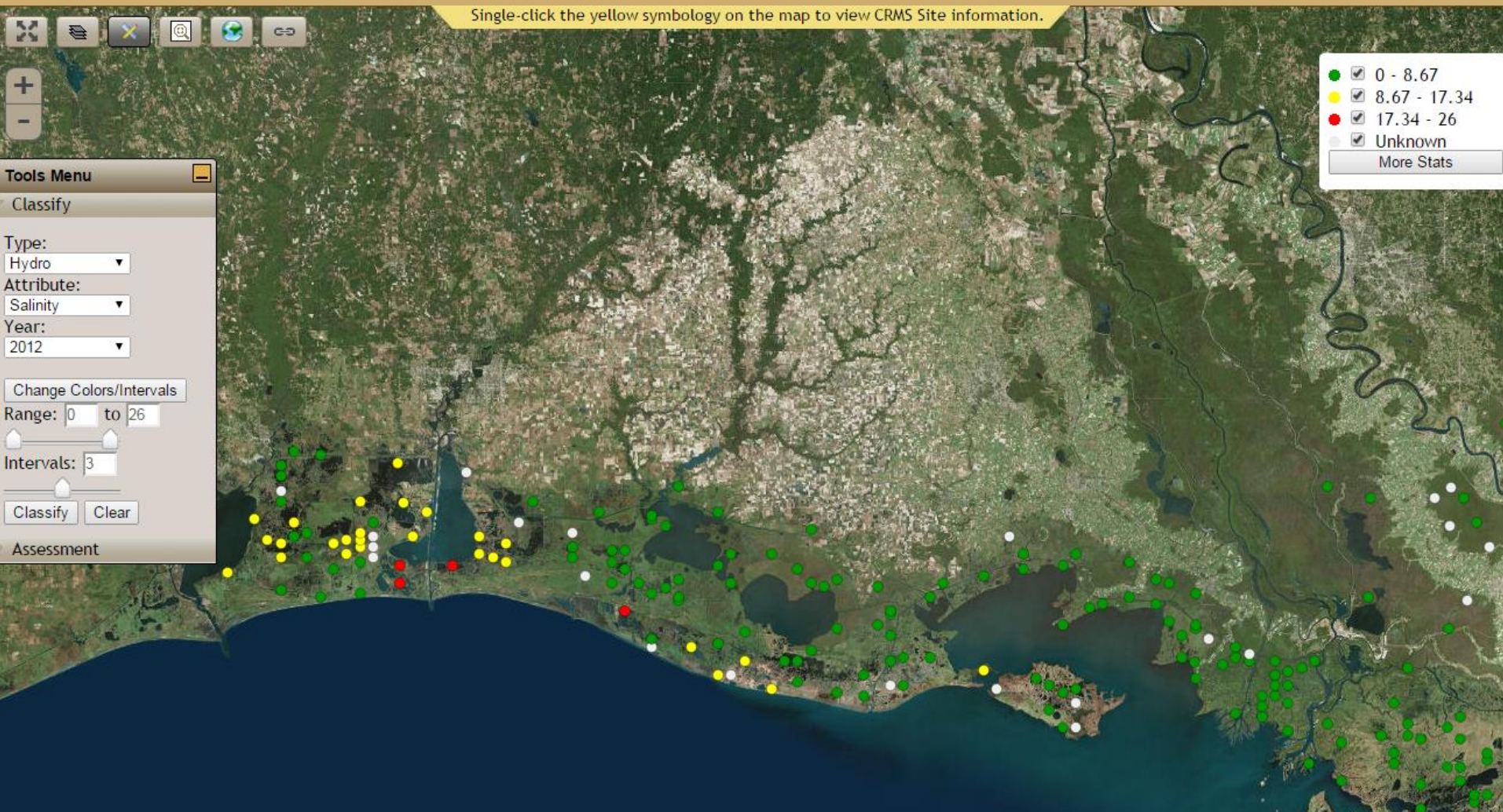
- Cumulative Elevation Change (CEC)
- Submergence Vulnerability Index (SVI)





Coastwide Reference Monitoring System – Wetlands

CRMS Classify Tool



User defines classification intervals and color ramp. For each CRMS index the defaults are red, yellow, green (as in the report card).

Tools Menu

Classify

Type: Hydro

Attribute: Salinity

Year: 2012

Change Colors/Intervals

Range: 0 to 26

Intervals: 3

Classify Clear

Assessment

Tools Menu

Classify

Type: Hydro

Attribute: Salinity

Year: 2012

Change Colors/Intervals

Range: 13 to 26

Intervals: 5

Classify Clear

Assessment

Tools Menu






Classify

Type: Hydro

Attribute: Salinity

Year: 2012

Change Ranges

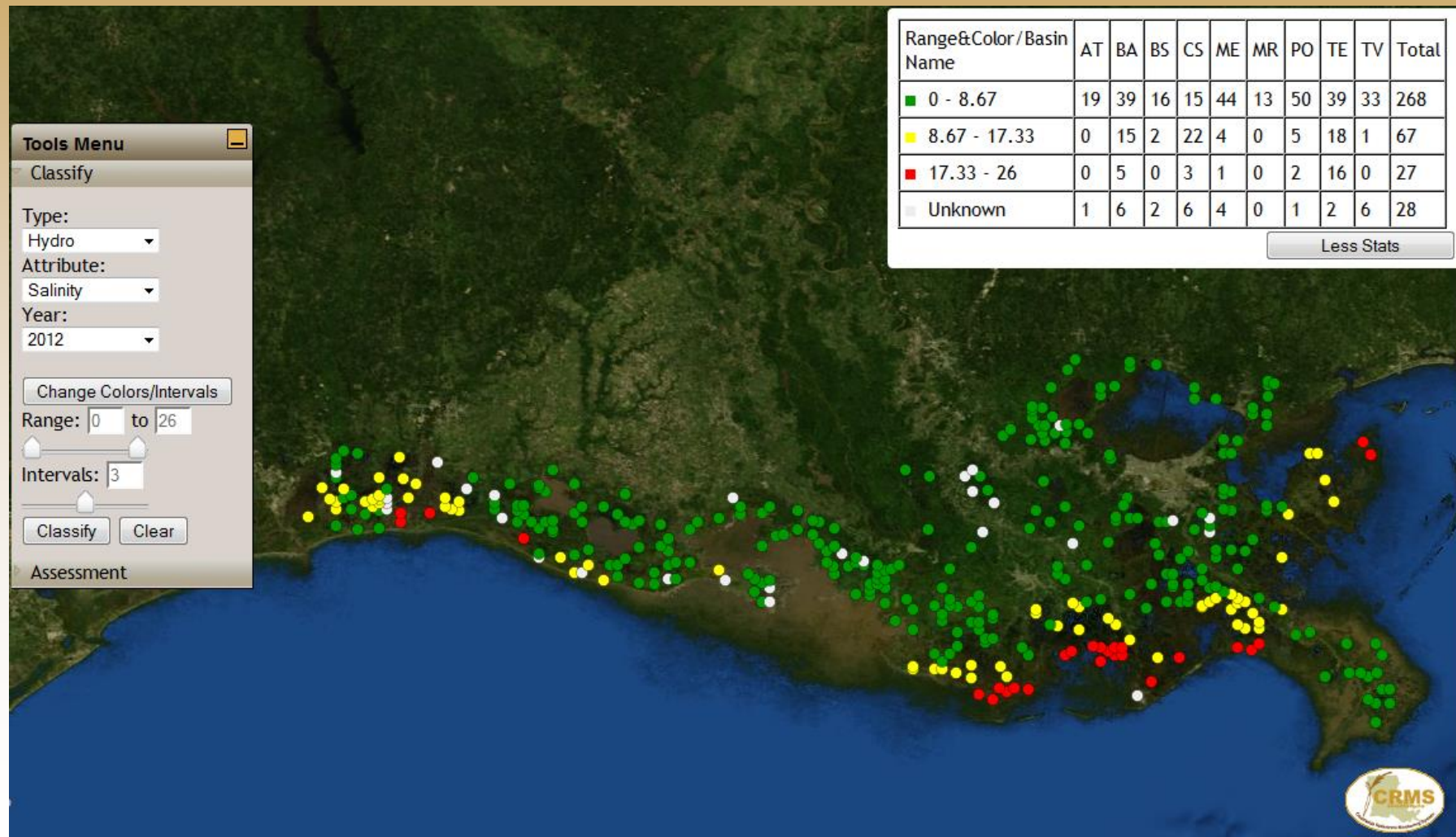
13	15.6	
15.6	18.2	
18.2	20.8	
20.8	23.40	
23.40	26	
Unknown		

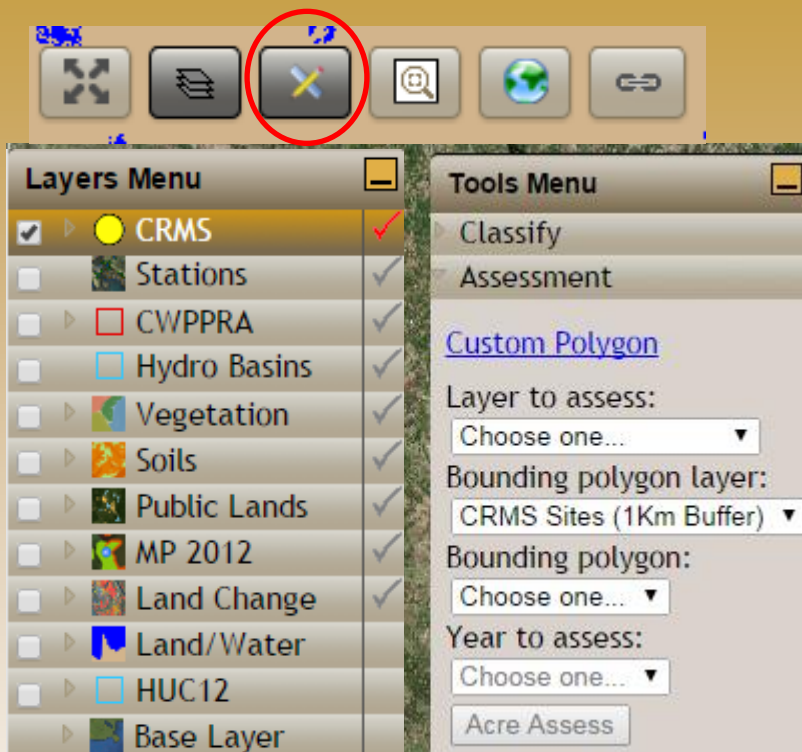
Classify

Assessment



The tool will tally the classification categories by hydrologic basin.





Acreage Assessment Tool provides area estimates of a chosen layer given a defined polygon.

Layers:

Coastwide Vegetation
Land/Water

Area:

CWPPRA Projects
Hydro basins
CRMS Sites (1km buffer)

Years:

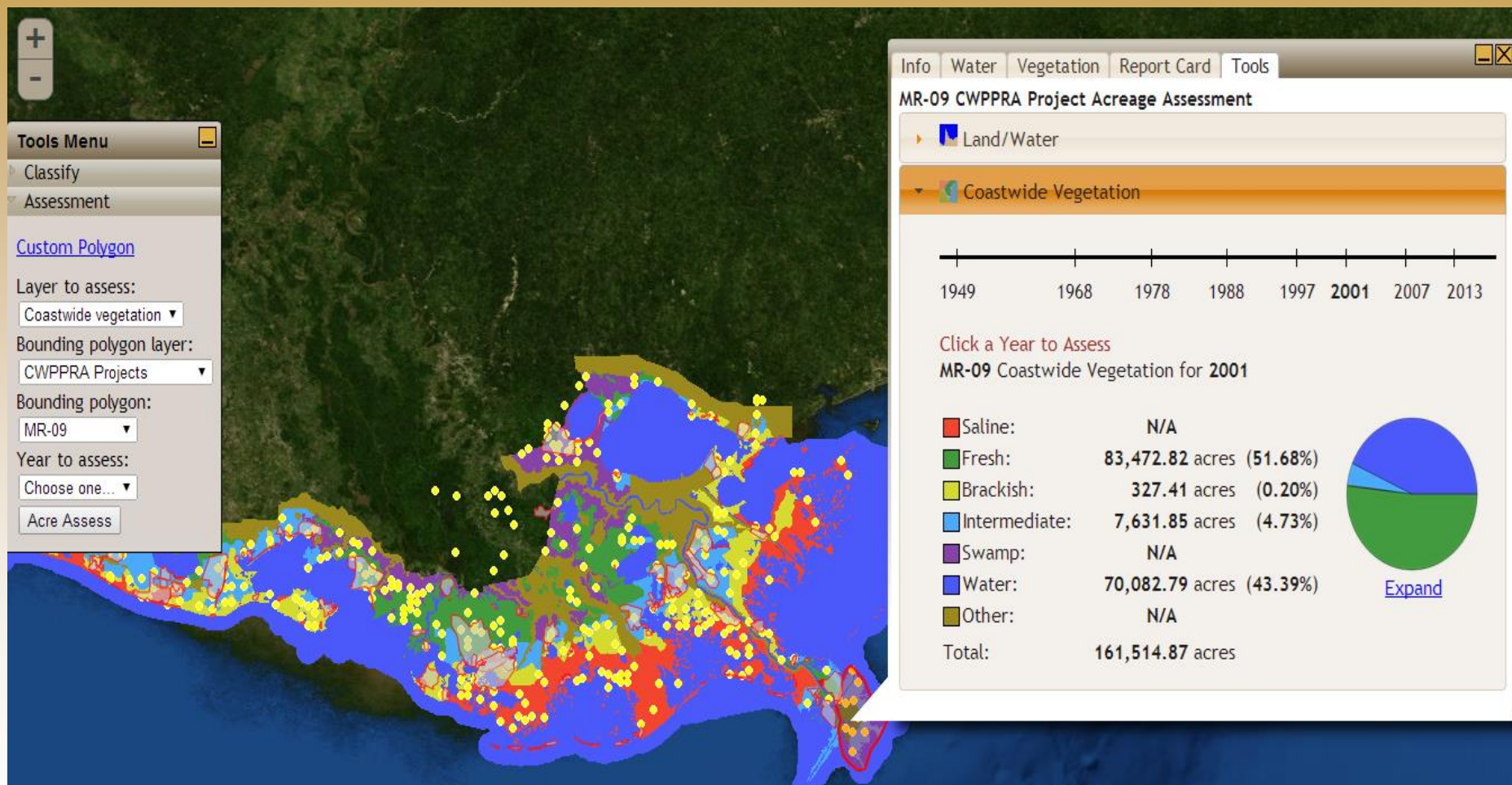
Varies based on layer dataset



Coastwide Reference Monitoring System – *Wetlands*

CRMS Acreage Assessment Tool

Acreage Assessment Tool





Questions?

<http://www.lacoast.gov/crms>

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